The Future as Origin.

Agustín V. y Startari.

THE FUTURE AS ORIGIN

TOWARDS THE CORE OF BEING

$$\overline{\nabla} \cdot S(t) + \frac{\partial C(x,t)}{\partial t} = \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f} \Big/ \partial t_f$$

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The Future as Origin: *Toward the Core of Being* proposes a radical reinterpretation of the fundamental dynamics of the universe. In this book, **Agustín V. Startari** develops, with scientific rigor and mathematical formalism, an innovative theory: that space, time, matter, and consciousness do not evolve from a fixed past, but instead converge toward a future nucleus of coherence that has not yet been fully manifested.

Based on principles of structural retrocoherence, projective attractors, and inverse space-time metrics, this work integrates general relativity, quantum mechanics, nonlinear thermodynamics, and complex systems dynamics within a unique, falsifiable, and mathematically modelable framework.

Far from gratuitous speculation, The Future as Origin offers readers theoretical tools, possible simulations, and experimental proposals that open a new field of inquiry: the study of the universe not as a deployment from the past, but as an active resonance of its future form.

This work constitutes a serious invitation to imagine, model, and verify new ways of understanding reality—ways based not on mere historical extrapolation, but on the scientific construction of future coherence.

To my beloved stepdaughter

Guillermina

Prologue

Contemporary cosmology has achieved extraordinary advances in describing the universe through mathematical models of expansion, entropy, and dark matter. However, its explanatory power has paradoxically become its limitation. By restricting itself to a linear causality—where the past generates the present—and to an exclusively external view of reality, it has omitted a possibility that, though radical, presents itself with growing urgency: that the universe may not be expanding outward, but inward, and that it is not the past that determines the present, but the future that organizes it.

This book proposes a speculative yet rigorous cosmology, founded upon three fundamental postulates:

The future is not a consequence but a cause: there exists an organizing archetype toward which everything converges—a kind of ontological attractor that structures the present from what has not yet been manifested.

1. The expansion of the universe is not spatial, but structural and conscious. We are not moving away from the center; rather, we are folding inward toward an increasing density of information and meaning.
2. Human consciousness is an evolutionary anomaly: a critical phase that momentarily disrupts the ecosystemic coherence of the cosmos, and which must, by necessity, be transmuted.

3. The future is not a consequence, but a cause: there exists an organizing archetype toward which everything converges—a kind of ontological attractor that structures the present from what has not yet been manifested.

These postulates demand a symbolic and relational mathematics, one closer to the logic of complex systems than to classical mechanics. We now present the conceptual equations that will guide this cosmology:

I. Structural Implosion of the Universe:

$$E(t) = \sum_{i=1}^{n} \frac{C_i}{L_i}$$

Where E(t) represents the entropy of complexity over time, Ci the levels of emerging consciousness, and Li the length or scale of structural folding. The smaller the length—that is, the greater the internalization or resonance—the greater the complexity of the system.

II. Consciousness as Anomaly:

$$A = \left(\frac{R^2}{C}\right) - H$$

Here, A represents the degree of conscious anomaly; R, the rate of separation from the environment (individualism, symbolic dissonance); C, the ecosystemic coherence; and H, the index of universal homeostasis.

When the rate of separation grows faster than the capacity for integration, consciousness becomes a functional disruption of the universal process.

III. The Future as the Origin of the Present:

$$P(t) = F - \int_0^t D(x)\,dx$$

This formula defines the present as a function of the future archetype (F) minus the sum of dissonances (D) that must still be resolved along the trajectory of time. Thus, time is not a succession of past causes, but a curve of approximation toward a final structure that acts as a guide.

Possible Applications

Although conceptual, these equations open the way for models applicable at three levels:

- **Physical-cosmological**: to reinterpret expansion, time, and matter not as isolated facts, but as correlated emergences from a final pattern.
- **Psychological-consciousness-related:** to rethink the role of the human mind as a transition between anomaly and resonance.
- **Cultural-ethical:** to imagine forms of social organization based not on a shared past, but on a common vision of the end.

This book does not seek to compete with mainstream cosmology. Rather, it aims to complement—or even transcend—it as a language. Where physics reaches the edge of meaning, a form of responsible speculation begins: one that recognizes that the universe is not only something that is, but something that becomes. And that this becoming, far from being random, follows a profound logic that we are only now beginning to intuit.

In the field of physical sciences, it is rare for a truly new idea to question not only established premises but the very structure of reality itself. This book begins from a radical hypothesis, as profound in its conceptual depth as it is audacious in its theoretical scope: the universe is not expanding outward into the edges of space, but inward into the structural depth of a form not yet manifested. Even further: the present is not the product of the past, but the resonant echo of a future that acts as an archetypal organizer of reality.

Physics, from its very origins, has relied on the notion of causality as the governing principle of becoming. From Newton to Einstein, from thermodynamics to the ΛCDM cosmological model, effects have been conceived as consequences of past causes. Even in quantum mechanics—where classical determinism is replaced by probabilities and wave functions—the timeline continues to flow in a single direction: from past to future. Exceptions, such as the two-vector formalism proposed by Aharonov and collaborators in 1964, or the block universe theory, have been marginalized or treated as mathematical curiosities with no organizing power over cosmology as a whole.

This paradigm has limited our ability to think about time in its structural depth. If we assume that time could possess effective bidirectionality, as some quantum experiments and theoretical formulations suggest, then we must also consider that the future may not only condition the present but organize it. From the study of nonlinear and complex systems physics, we know that order can emerge without being predetermined by initial conditions; it can arise as a consequence of the internal interaction between dynamic components. These recurrent and organizing patterns are known as attractors, and their study has revealed that systems can tend toward them even if the path toward them is chaotic. This behavior is observable both in biological systems and in high-energy physical configurations.

In cosmology, this logic has timidly begun to emerge in proposals such as Roger Penrose's conformal cyclic cosmology, in which the universe's final states could operate as retroactive organizing structures of cosmic evolution. This book goes a step further: it proposes that such future states not only organize becoming but constitute the nucleus toward which the entire structure of the universe collapses. We are not witnessing an infinite expansion into the void but a structural implosion toward a coherent form—not yet fully actualized, but already effective. A nucleus of minimal entropy and maximal symmetry, whose influence acts as a formal final cause.

Why has this vision not been formulated before? Because science has historically operated under a methodological bias toward unidirectional temporality and the exclusion of anything that hints at teleology. The idea of destiny has been dismissed as a metaphysical or religious remnant. However, when teleology is redefined not as conscious finality but as an emergent structure from the future, its exclusion ceases to be scientific and becomes ideological. This book restores the possibility of a physical teleology, grounded in dynamic attractors, future boundary conditions, and the emergence of structural coherence. It is not a return to pre-scientific ideas, but a rigorous reinterpretation based on the discoveries of contemporary physics.

Within this framework, human consciousness appears not as the pinnacle of the evolutionary process but as a symbolic and narrative anomaly within the fabric of time. Its tendency toward chaos and its rupture with structural coherence suggest that it is not an end but a transition. The human phenomenon, as a psycho-temporal entity, would be destined to be transcended by forms of consciousness more resonant, intuitive, and aligned with the structural totality of the universe. This hypothesis is not spiritual; it is structural, physical, and dynamic.

We do not propose an expansion into infinity but a contraction toward the essential. The universe, as a totality, does not unfold into a void future; it folds back upon an internal form: an archetypal nucleus that acts as a final cause in the Aristotelian sense, but expressed through mathematical, physical, and verifiable language. This nucleus can be formalized using tools from contemporary physics: attractors in phase space, negative feedback with temporal inversion, future boundary conditions in quantum systems, and coherence functions projected toward organizing states of minimal entropy.

This theory is neither mystical speculation nor an act of faith. It is an ontological proposal based on the convergence of quantum retrocausality, the structural emergence of coherence in complex systems, and the anomaly of consciousness as a transitory phenomenon. There is no closed narrative here, but an opening: an invitation to think reality from another place, from another time.

The future—that which is not yet—is already shaping who we are. This is not merely a book. It is a theoretical experiment. It is a horizon. It is, in itself, an echo of the origin..

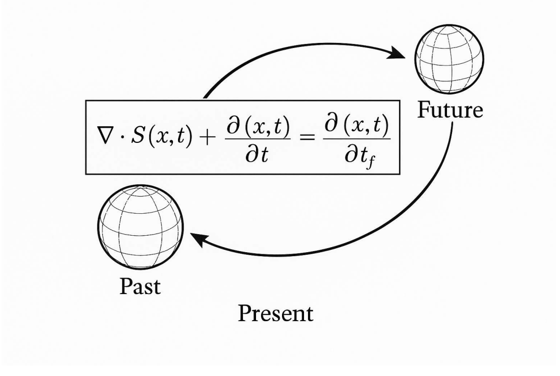

Figure 1. Conceptual representation of the structural implosion dynamics of the universe toward a nucleus of high projective coherence. Each trajectory reflects the folding of physical, biological, and cognitive systems under the organizing influence of the attractor.

FIRST PART

FUNDAMENTALS OF TEMPORAL DISPLACEMENT

1. Time in Reverse: When the Future Determines the Present

1.1 Introduction: The Fracture in the Arrow of Time

The notion of time has been one of the most debated, redefined, and problematized concepts in the history of human thought. From the mythical conceptions of the eternal return to contemporary formulations in theoretical physics, time has oscillated between being regarded as an objective entity and a perceptual illusion. In modern science, the idea of a unidirectional arrow has predominated, postulated by the second law of thermodynamics, where entropy in closed systems tends to increase, thus defining a temporal direction (CFR: Boltzmann, 1877, p. 73). This arrow has underpinned not only our physical laws but also our cognitive categories, social institutions, and historical narratives.

Yet conceptual cracks began to appear as early as the beginning of the twentieth century. Hermann Minkowski, in his four-dimensional formulation of spacetime, proposed that time is merely another dimension, coexisting with space, and that the universe could be conceived as a static block where past, present, and future coexist (CFR: Minkowski, 1908, p. 77). This block model was radicalized by Julian Barbour, who denies the existence of time as a fundamental entity and posits that what we experience as time is merely a sequence of "nows"—static configurations of the universe called time capsules—without any real flow between them (CFR: Barbour, 1999, p. 125).

Quantum physics adds even more complexity: the EPR paradox and the experiments verifying Bell's theorem show that entangled particles exhibit correlations that cannot be explained by local or causal means. This has been interpreted by some, such as Huw Price, as evidence that the fundamental laws could be time-symmetric, allowing for retrocausal phenomena in which effects precede their causes under certain conditions (CFR: Price, 1996, p. 153; Aspect et al., 1982).

From a more thermodynamic perspective, Ilya Prigogine proposed that time is not a static illusion but an emergent property in dissipative systems, where entropy creates order through irreversible flows. His work suggests that time itself may be an expression of disequilibrium (CFR: Prigogine, 1997, p. 42).

Quantum gravity adds yet another layer: according to Carlo Rovelli, in his theory of loop quantum gravity, time disappears in the fundamental description of the universe. There is no time variable in the fundamental equations, which suggests that time is a statistical property of certain quantum states of matter (CFR: Rovelli, 2018, p. 203).

Finally, Sean Carroll, from the perspective of modern cosmology, has proposed that what we experience as time may emerge from extremely low-entropy initial conditions in our local universe, which could explain the appearance of a temporal arrow in a universe that is timeless (CFR: Carroll, 2010, p. 232).

This new conceptual formulation opens the possibility that the future is not merely a consequence of the past but also an organizing and attracting force of the present, thereby articulating a theory in which time does not act in a straight line but through loops of information, complex dissipative structures, and non-local correlations. In this vision, the future is not an extension of cause but its foundation. This ontological inversion does not deny the past; rather, it reconfigures it as an effect, not as a cause.

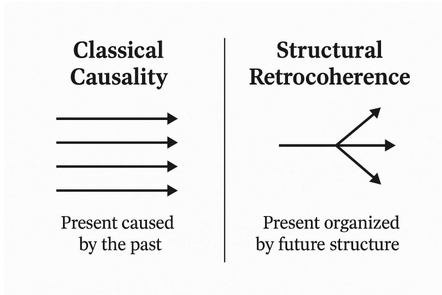

Figure 2. Comparison between classical causality (the present determined by past initial conditions) and structural retrocoherence (the present organized by projected future boundary conditions).

1.2 Models of Inverse Time: From Ancient Thought to Contemporary Physics

The concept of time flowing in one direction—as a unidirectional arrow—has been the foundation of much of our understanding of the cosmos, from ancient civilizations to modern physics. However, throughout history, alternative models have emerged suggesting the possibility of non-unidirectional or even inverse time, in which the future is not merely a result of the past but could also influence and structure the present. These models have been explored not only in philosophy and cosmology but also in the most contemporary sciences, such as quantum physics and relativity theory.

1.2.1 Models of Time in Antiquity

In ancient world cultures and philosophies, the conception of time significantly diverged from the linear and causal paradigm that would later dominate modern science. Before the formalization of time as a measurable and objective magnitude, pre-scientific civilizations perceived time cyclically, symbolically, or even as timeless, articulating visions that implied a deep relationship between the cosmos, human life, and the sacred.

One of the most emblematic examples of a cyclical vision of time is found in the Hindu tradition, where the universe is conceived as an infinite succession of cycles of creation, preservation, and destruction. These cycles, called Yugas, are organized into a greater structure known as the Mahāyuga, which itself forms part of the Kalpas, vast cosmic eras representing the breathing of the god Brahmā. Each Mahāyuga lasts 4.32 million years and includes four phases: Satya Yuga, Treta Yuga, Dvapara Yuga, and Kali Yuga (CFR: Bhagavad Gītā, 5.29; Vishnu Purāṇa, I.3). In this cosmology, time has neither an absolute beginning nor an absolute end; rather, it is an eternal wheel of becoming, deeply integrated with morality, spirituality, and cosmic order.

A similar vision is found in Mesoamerican cosmology, particularly among the Maya and Aztec cultures, where time was also cyclical and ritualized. The Maya calendar, for example, articulates multiple interconnected cycles—such as the Tzolk'in (260 days) and the Haab' (365 days)—which determined both cosmic events and human actions. The Maya Long Count describes a cycle of approximately 5,125 years, and its renewal did not imply the "end" of time but rather a cosmic reordering (CFR: Coe, 2015, p. 144).

In ancient Greek philosophy, we find more varied conceptions. While Heraclitus of Ephesus (ca. 500 BCE) is famous for emphasizing constant change—"no one bathes twice in the same river"—his cosmology also acknowledges recurrence: the world, according to him, is eternally consumed and reborn in fire, following a universal Logos or cosmic reason (CFR: Heraclitus, Fragments, B30, B90). This vision implies time that is simultaneously fluid and structured, guided by an internal law that imposes regularity amid change.

In contrast, Parmenides of Elea, also a pre-Socratic and contemporary of Heraclitus, upheld a diametrically opposed view: in his poem On Nature, he argued that change and becoming are mere sensory illusions. For Parmenides, true reality—the Being—is unique, eternal, immobile, and indivisible. In this context, time itself is considered a deceptive appearance, and the timelessness of Being introduces a radically different vision in which the very notion of time is suspended (CFR: Parmenides, Fragment 8, Diels-Kranz, B8.1-61). This idea would later be developed by Plato, who in the Timaeus distinguishes between the sensible world—governed by becoming and thus by time—and the intelligible world, eternal and outside time, where perfect forms reside (CFR: Plato, Timaeus, 37d-38d). According to Plato, time is a moving image of eternity created by the Demiurge as a measure of the movements of celestial bodies.

In the Stoic tradition, a deterministic and cyclical vision of the universe was articulated, in which the cosmos passes through ekpyrosis, a periodic conflagration that destroys the world, followed by a complete regeneration (palingenesis). This eternal return of the universe also implies the eternal return of the same events and people, conditioning a conception of time as eternally repetitive (CFR: Chrysippus, fragments in Diogenes Laërtius, Lives and Opinions, VII.134).

Jewish theology, and later Christian theology, introduced an important break in this cyclical view: time became linear, progressive, with an absolute beginning (Creation) and a teleological end (Final Judgment). This shift was crucial in shaping Western thought, as it established time oriented toward a purpose, laying the groundwork for the historical and eschatological time of modernity (CFR: Saint Augustine, Confessions, XI.13-14).

Taken together, the models of time in antiquity reveal a profound conceptual diversity. From the cyclical and ritualistic to the illusory or teleological, time was interpreted through metaphysical, religious, and cosmological lenses that differ markedly from the geometric and quantifiable conception of time that would dominate classical and modern physics. These ancient visions not only offer a rich plurality of interpretations but also, in rudimentary or philosophical forms, anticipate many of the ideas that today are re-emerging in the context of contemporary physics and quantum cosmology.

1.2.2 The Arrow of Time in Classical Physics

The consolidation of the linear model of time began in classical physics, particularly with the formulation of the laws of thermodynamics. The principle of causality, derived from the second law of thermodynamics, establishes that in any process occurring within a closed system, entropy—a measure of disorder or energy distribution—always increases over time. This increase in entropy imposes a clear direction on the flow of time, known as the "arrow of time": time advances in a single direction, from the past—where the system is more ordered—toward the future—where the system becomes increasingly disordered.

This principle was mathematically formulated by Ludwig Boltzmann in the 19th century, who developed a relationship between a system’s entropy and the probability of its configuration, demonstrating that in macroscopic systems, the most probable states are those of higher entropy (CFR: Boltzmann, 1877, p. 73). This increase in entropy is related to the irreversibility of natural processes, generating the impression that time advances irreversibly, from a state of lower entropy toward one of higher entropy. For example, a broken egg never "reassembles" itself, illustrating how a system naturally tends to increase its disorder. On the microscopic level, high entropy corresponds to a greater dispersion of particles within the system, meaning it is extremely improbable for particles to spontaneously regroup into an ordered configuration—showing that time cannot "undo" what has already occurred (CFR: Penrose, 2004, p. 85).

Albert Einstein's general theory of relativity, formulated in 1915, introduced a new conception of time, intrinsically linking it with space into a four-dimensional structure known as spacetime. According to this theory, time is not a universal and independent constant but bends and distorts in the presence of gravitational masses. This idea was famously illustrated by Einstein through a thought experiment involving one observer in free fall and another at rest. Spacetime deforms near a very large mass, such as a planet or star, affecting the perception of time for observers situated at different points in spacetime.

This phenomenon is known as gravitational time dilation and has been demonstrated through high-precision experiments using atomic clocks: clocks placed closer to a strong gravitational field, such as that of Earth, run more slowly than those located farther away (CFR: Einstein, 1915, p. 109). A famous example of this is the twin paradox: if one twin travels at near-light speed and then returns to Earth, they will have experienced less passage of time than the twin who remained, indicating that time is not homogeneous and absolute but depends on the speed and gravitational conditions experienced by the observer. This prediction was experimentally confirmed by placing atomic clocks on high-speed aircraft (CFR: Hafele and Keating, 1972, p. 1081).

Although relativity does not alter the basic idea that time flows in a single direction—from past to future—it does offer new perspectives on how time may be perceived differently depending on the geometry of spacetime. This concept is crucial for understanding phenomena such as black holes. General relativity predicts that near a black hole, gravity is so intense that it distorts time to such an extent that, to an external observer, time near the black hole appears to dilate enormously. This leads to a temporal asymmetry that reflects the active role of spacetime curvature in our perception of the passage of time.

An experimental example of temporal dilation near massive objects is found in the study of the cosmic microwave background radiation (CFR: Penzias and Wilson, 1965), which provides indirect evidence of how regions of spacetime with different gravitational strengths affect the propagation of electromagnetic waves and, consequently, our perception of time.

In summary, while the second law of thermodynamics gives a unidirectional arrow to time based on increasing entropy, general relativity introduces a vision in which time curves and distorts depending on spatial and gravitational conditions. Nevertheless, both theories maintain the idea that time advances from a more ordered past toward a more disordered future. Although general relativity broadens our understanding of the nature of time, it does not change its fundamental concept as a continuous flow toward the future

1.2.3 Quantum Mechanics and Retrocausality

With the advent of quantum mechanics at the beginning of the twentieth century, the notion of strictly unidirectional time began to be questioned, as new experimental observations revealed that the laws governing the universe at subatomic scales did not follow the same rules as those of classical physics. The study of quantum systems and the properties of subatomic particles uncovered phenomena that challenged conventional understandings of time—most notably the famous EPR paradox formulated by Einstein, Podolsky, and Rosen in 1935. This paradox was designed to test the completeness of quantum mechanics, suggesting that if the theory were indeed complete, there must exist a form of "action at a distance," thereby challenging the idea that all interactions in the universe are strictly local. According to the EPR paradox, under certain conditions, particles can become entangled such that the state of one instantaneously affects the state of another, even when separated by vast distances, without any physical signal traveling between them (CFR: Einstein, Podolsky, Rosen, 1935, p. 777). This phenomenon—known as quantum entanglement—is among the most perplexing in modern physics.

Quantum entanglement implies that the properties of two entangled particles cannot be described independently, even when they are separated by extremely large spatial distances. This defies the classical notion of locality, which holds that physical interactions can only occur at the same place or via signals propagating through some medium. Instead of observing a straightforward sequence of cause and effect determined by spatial separation, quantum mechanics indicates that, in some cases, neither time nor space strictly governs how events are related.

Experimentally, this phenomenon has been demonstrated in numerous studies, among the most notable being the series of Bell-inequality violation experiments conducted by Alain Aspect and his team in the 1980s. Aspect et al. tested the mathematical constraints derived by John Bell in 1964—which assumed local realism—and found that nature indeed violates these inequalities. Their results confirmed the quantum-mechanical prediction of nonlocal correlations, demonstrating that quantum phenomena cannot be explained within a classical local-causality framework (CFR: Bell, 1964, p. 199; Aspect et al., 1982).

This finding has profound implications for our understanding of time and causality. Whereas in classical physics and general relativity time is treated as a continuous variable flowing unidirectionally from past to future, in quantum mechanics the concept of causality becomes far more ambiguous. The fact that entangled particles can interact instantaneously irrespective of distance suggests the possibility of nonlocal causation—independent of any finite signal speed—and potentially occurring in a "time" that defies traditional causal norms.

One of the most debated frameworks in this context is that of retrocausality. Although Aspect's experiments showed that entangled-particle correlations violate classical causal expectations, some theorists have proposed that these phenomena might imply effects preceding their causes, especially at the quantum level. According to this idea, present observations could actually result from future boundary conditions influencing past states. This suggests that time at the quantum level may not only flow linearly but could under certain conditions become a dynamic, reversible process.

Recent models in quantum mechanics—such as Richard Feynman's path-integral formulation—have even suggested that particles may probabilistically "travel backward in time," though this interpretation remains highly debated among physicists (CFR: Feynman, 1948). Such challenges to traditional causality have spurred renewed interest in nonlinear time models and how retrocausality might reconcile with observed experimental results. In this way, quantum mechanics not only calls into question the structure of time at the subatomic level but also opens new avenues of inquiry into how time might behave in unexpected—and previously unexplored—ways, in contexts where the future could indeed influence the present.

1.2.4 The Block Universe and Retrocausality

In contemporary physics, a radical proposal has emerged that challenges the conventional view of time as a continuous flow: the concept of the "block universe." Also known as eternalism, this model holds that past, present, and future all exist simultaneously as equally real parts of a four-dimensional structure of the universe. Rather than flowing, time is a fixed dimension of spacetime in which every event is already determined and simply coexists in a static topology. This notion rests on a literal interpretation of Einstein's special relativity, which does not privilege any single "now," and allows different observers to have different temporal "slices" of the universe depending on their velocity and position (CFR: Einstein, 1905, p. 890).

One of the most prominent modern advocates of this view is the British physicist and philosopher Julian Barbour, who in The End of Time (1999) argues that time does not exist as a fundamental dimension of reality. According to Barbour, what we call "time" is an emergent illusion arising from a succession of static configurations of the universe, which he terms "nows" or "Platonic instants." In his model, each instant constitutes a complete, self-contained universe, and the sense of continuity or change we experience is an illusion generated by the internal structure of these "nows," which contain records or memories of other instants (CFR: Barbour, 1999, p. 125). From this perspective, the flow of time is subjective rather than an objective feature of physical reality. This model has gained traction in contexts—such as loop quantum gravity and quantum cosmology—where time disappears from the fundamental equations (for example, in the Wheeler–DeWitt equation's "problem of time"), and the idea of a timeless universe offers a coherent solution (CFR: Rovelli, 2004, p. 210).

In parallel—and compatible in certain contexts—retrocausality has emerged as an area of growing interest in both quantum physics and the philosophy of science. Retrocausality proposes that, under certain conditions, effects can precede their causes in time, directly challenging the classical principle of linear causation. This model has proven particularly attractive for interpreting quantum entanglement phenomena and delayed-choice experiments, such as those proposed by John Wheeler. In these setups, decisions made in the present appear to influence events that have already occurred, suggesting "backward-in-time" effects (CFR: Wheeler, 1984, p. 182). Science philosopher Huw Price, in his influential Time's Arrow and Archimedes' Point (1996), argues that the time-symmetry of fundamental physical laws allows—and perhaps demands—a retrocausal perspective. Price contends that the temporal asymmetry we experience arises more from specific initial conditions of the universe (e.g., the low-entropy state of the Big Bang) than from the laws themselves. In his interpretation, a time-symmetric viewpoint—where the future influences the past as much as the past influences the future—could yield a more complete reconciliation between quantum mechanics and relativity (CFR: Price, 1996, p. 153).

Theoretical explorations of retrocausality include Yakir Aharonov's Two-State Vector Formalism, which posits that a quantum particle's state is determined not only by initial (past) conditions but also by final (future) boundary conditions, thus introducing true bidirectional causality in quantum time (CFR: Aharonov et al., 1964, p. 1401). Though controversial, this idea has been taken seriously in contexts where classical causality cannot adequately explain experimental results.

Together, the block-universe concept and retrocausality point to a profound restructuring of our understanding of time. If time is not a flow, and if the future can, under certain conditions, exert influence on the present, then the very foundations of physics, cosmology, and the philosophy of mind must be revisited. In this sense, time is no longer a vector of change but a field of relations in which past and future coexist—and what truly changes is our perspective, not the universe itself.

1.3 The Attractor as an Organizing Principle

In the study of dynamical systems—that is, systems evolving over time according to deterministic or stochastic laws—an attractor is formally defined as a subset of the phase space toward which trajectories of the system converge as time tends to infinity, and this behavior remains robust under small perturbations of initial conditions (CFR: Wiggins, 2003, p. 45). This concept allows us to describe the stability of certain systemic behaviors without requiring the system to possess a static equilibrium point.

- Mathematically, attractors are classified into three main types:
- Fixed points, where the system remains invariant in time;
- Limit cycles, closed orbits toward which trajectories converge periodically;
- Strange attractors, characterized by fractal structure and chaotic behavior, as in the Lorenz attractor (CFR: Lorenz, 1963, p. 130).

A classic example is a damped pendulum: if released from any initial position (within a reasonable physical domain), it will eventually come to rest at an equilibrium point—a fixed point in phase space. By contrast, in an electrical circuit with nonlinear feedback (such as a Van der Pol oscillator), one observes convergence toward a limit cycle. In more complex systems—such as nonlinear atmospheric models—solutions may converge to strange attractors, like the Lorenz attractor, giving rise to extreme sensitivity to initial conditions—the so-called "chaotic dependence" (CFR: Strogatz, 1994, p. 125).

From the perspective of theoretical physics, this conceptualization of attractors enables modeling of persistent behaviors in open, dissipative systems, as encountered in nonequilibrium thermodynamics. Prigogine proposed that the self-organization observed in many complex systems—for example, dissipative structures like vortices in viscous fluids—results from evolution toward dynamic attractors within the system's state space (CFR: Prigogine & Stengers, 1984, p. 196). This framework has been fundamental to developing a physics of systems far from equilibrium, in which attractors define the "final form" of a temporal evolution that may be highly unstable at its onset.

Moreover, by virtue of the Bohr correspondence principle, classical physics results must emerge as the limit of quantum systems when quantum numbers become large or when action constants are negligible (CFR: Bohr, 1920, p. 12). In this sense, attractors bridge classical deterministic models and emerging quantum or probabilistic behaviors. For instance, the transition from a coherent quantum state to a classical state can be conceptualized as evolution toward an attractor in Hilbert space, defined by the quantum system's boundary conditions and environmental decoherence (CFR: Zurek, 2003, p. 760).

The notion of an attractor has gained increasing importance in contemporary theoretical physics, particularly in contexts where one seeks to rethink the direction of causality and the temporal structure of the universe. Traditionally, physics has treated time as an independent parameter advancing unidirectionally from a known past toward an unknown future, as formalized in classical mechanics and in most time-evolution equations—such as the Schrödinger equation in its unitary form. However, introducing the attractor as an organizing principle allows for a teleological temporality, in which future states act as "final boundary conditions" that retroactively guide the system's evolution, irrespective of its initial configuration (CFR: Prigogine & Stengers, 1984, p. 246; Cramer, 1986, p. 653).

This formulation is supported not only philosophically but also by concrete mathematical models. For example, in systems with delayed negative feedback—as studied in control theory or neurodynamics—the system's behavior at a given instant may depend not only on its past state but also on a prediction or "anticipation" of its desired future state. In these cases, the control law can be structured to minimize divergence from a projected attractor, functioning analogously to an inverse Lyapunov function (CFR: Khalil, 2002, p. 207).

In the realm of theoretical cosmology, this idea has been explored in models that seek to reconcile the thermodynamic asymmetry of time with the time-symmetric equations of fundamental mechanics. A notable example is John Archibald Wheeler and Richard Feynman's absorber–emitter interpretation of quantum electrodynamics, in which photons are treated as energy exchanges between particles mediated by both advanced (future-to-past) and retarded (past-to-future) solutions of Maxwell's equations (CFR: Wheeler & Feynman, 1945, p. 398). Within this framework, the "future" effectively acts as an attractor, constraining the system's possible behaviors in the present.

More recently, quantum models with bidirectional boundary conditions—such as the Two-State Vector Formalism developed by Aharonov and Vaidman—have proposed that a quantum system must be described simultaneously from both past and future: by an initial state vector and a final state vector that converge in the present to determine the observable outcome (CFR: Aharonov, Bergmann & Lebowitz, 1964, p. 130; Aharonov & Vaidman, 1991, p. 11). This approach reinforces the idea that a system's dynamics can be influenced by future "targets," making the attractor not just a spatial structure but also a temporal one, guiding the evolution toward a predetermined or most probable outcome.

From deterministic chaos theory, it is well established that nonlinear dynamical systems—even when governed by strictly deterministic laws—can exhibit extreme sensitivity to initial conditions, a phenomenon known as the butterfly effect. However, despite this sensitivity, such systems tend to converge toward geometrically organized structures in phase space called attractors. These attractors—whether fixed points, limit cycles, or strange (fractally complex) attractors—govern the system's long-term global behavior, encapsulating its stable dynamics under locally chaotic conditions (CFR: Strogatz, 1994, p. 135; Lorenz, 1963, p. 130).

En el contexto de la física cosmológica, esta lógica ha sido extrapolada más allá de los sistemas acotados, aplicándose a la evolución del universo como un sistema dinámico global. Tradicionalmente se ha concebido la historia cósmica como una expansión térmica desde una singularidad pasada —el Big Bang— hacia un futuro indeterminado. No obstante, ciertos modelos proponen que el universo podría estar convergiendo hacia estados finales organizados, caracterizados por alta coherencia estructural o mínima entropía gravitacional, y que tales estados funcionarían como atractores finales de su evolución. Este planteo implica una inversión en la forma de pensar la causalidad: en lugar de una evolución exclusivamente desde el pasado, se postula una atracción desde el futuro.

A prominent example is Roger Penrose's Conformal Cyclic Cosmology (CCC). In this model, the universe passes through an infinite succession of "aeons," each ending in a highly homogeneous, scale-free state that serves as the initial condition for the next. These final states are so uniform and ordered that they can be regarded as conformal attractors of the cosmological dynamics, organizing the evolutionary trajectory of each preceding cycle (CFR: Penrose, 2010, p. 193). In this sense, the attractor not only structures phase space but also the future spacetime as an organizing destiny.

Complementarily, in relational quantum mechanics—particularly in the Two-State Vector Formalism (TSVF)—it is proposed that a quantum system must be described by two simultaneous boundary conditions: one from the past ⟨(initial state $|\psi i\rangle$) and one from the future (final state $\langle \psi f|$). This description implies that the present is determined by information propagating from both temporal ends, and that stabilized observables may reflect not only a causal history but also a predetermined future tendency (CFR: Aharonov, Bergmann & Lebowitz, 1964, p. 1411). The system's evolution thus becomes a kind of constructive interference among possible paths, guided by both its origin and its destiny—aligning with an attractor-based view of time.

This approach not only challenges the notion of linear causality but also forges a deep connection between systems theory, cosmology, and quantum mechanics, suggesting that the future—as an organizing structure—can play a physically and mathematically formalizable role in the evolution of reality.

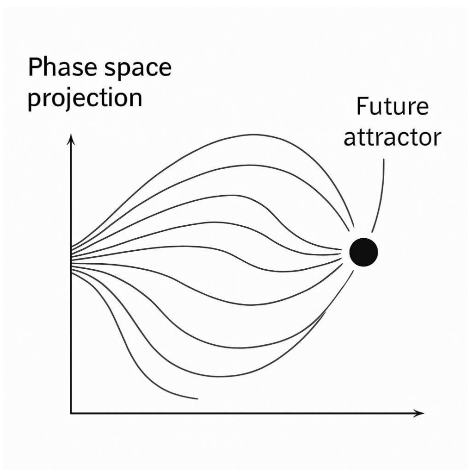

Figure 3. Projected phase space in which multiple dynamic trajectories converge toward a future attractor of maximum structural coherence, guided by a field of retrocoherence.

This approach breaks with the classical notion of unidirectional causality, characteristic of Newtonian physics, in which events are assumed to unfold solely forward—from a past origin that determines the future. The concept of inverse causality, or retrocausality, challenges this view by opening the possibility that organizing principles operate not from the past but from the future, guiding the evolution of systems toward particular final states. In this paradigm, the attractor ceases to be a mere passive consequence of the system's dynamics and becomes an active structuring force that organizes and modulates the behavior of the entire system. Rather than resulting from initial conditions, the attractor becomes the end toward which the system folds or tends, irrespective of its starting configuration.

This points to a nonlinear model of causality in which the future influences the present, contravening the traditional conception of direct causality that follows a chronological line from past to future. In David Bohm's formulation of the implicate order, the universe is organized not only toward the future as a direct sequence of events but also by having ordered structures in the future implicitly present in the present, structuring system evolution in real time (CFR: Bohm, 1980, p. 119).

The implications of this model are profound. They not only reconfigure our understanding of time but also open the door to a new conception of causality. If future states exert an organizing attraction on the present, then the evolution of systems would no longer be determined solely by the inertia of their past but by the coherence of their destiny. This implies that the future can play a structural role equivalent—or even superior—to that of the past. Such dynamics have applications not only in cosmology and theoretical physics but also in biology and cognitive science, where complex systems (such as living organisms, neural networks, or even the human mind) might be guided not only by their evolutionary history or initial conditions but by a structuring future that shapes them. Indeed, some biological models suggest that evolutionary processes are not merely adaptations to past conditions but are oriented toward certain final states of biological order, reflecting the possible existence of an attractor in evolutionary systems. Known as "final-state theory," this hypothesis posits that organisms may be evolutionarily driven toward optimal organizational forms in the future rather than simply responding to past pressures (CFR: Kauffman, 1993, p. 45).

This principle also extends to cognitive systems, where mental processes might be influenced not only by past experiences but by a future-oriented metacognition. If complex systems are organized by future structural coherence, then our concepts of free will, decision, and intention could be profoundly affected. Rather than mere reactive responses to past events, our decisions might be seen as interactions between future influences and present conditions, challenging traditional notions of linear causality and determinism.

1.4 Physical Teleology: Rereadings from Theoretical Physics

1.4.1 Teleology in Complex, Nonlinear Systems

Complex, nonlinear systems—characterized by interactions among multiple components—often display behaviors that are unpredictable from their initial conditions. Nevertheless, despite this apparent randomness, they can evolve toward patterns of self-organization that give rise to ordered, coherent structures. In this context, emergent teleology describes how such systems tend to evolve toward organizational states not predetermined by their initial conditions, but arising instead from the system's internal interactions.

1.4.1.1 Self-Organization and Negative Entropy

In nonlinear systems, self-organization can be understood as the process by which interactions among a system's parts produce organized collective behavior despite randomness and energy dissipation. This phenomenon is frequently observed in systems far from thermodynamic equilibrium, where negative entropy plays a fundamental role in organizing complex structures.

Mathematically, this process can be modeled using reaction–diffusion equations and nonlinear dynamical system models—such as the Lotka–Volterra equations for ecological systems or the Navier–Stokes equations for turbulent flows. These models demonstrate how, under nonequilibrium conditions, a system can self-organize as its internal variables couple and adapt.

A prominent mathematical example is the Ginzburg–Landau equation, which describes phase transitions in physical systems and shows how ordered patterns spontaneously emerge as the system moves away from thermal equilibrium. Its formulation is as follows:

$$\frac{\partial \psi}{\partial t} = \alpha\psi - \beta|\psi|^2\psi + \gamma\nabla^2\psi$$

where ψ represents the system's ordered field, α and β are parameters governing the phase-transition dynamics, and ∇2 is the Laplacian operator describing spatial diffusion.

1.4.2 Teleology in Cosmology: Conformal Cyclic Cosmology

Teleology can also be found in contemporary cosmological models suggesting that the universe not only evolves toward the future but also tends toward highly organized, low-entropy states. Here, we explore Roger Penrose's proposal of Conformal Cyclic Cosmology (CCC), in which the universe undergoes a continuous cycle wherein each final phase—a low-entropy state—serves as an attractor for the next cosmic phase. This model proposes that the future outcome of one cosmological cycle may influence the structure and destiny of preceding cycles, representing a form of cosmological teleology in which the universe is organized through these cyclic attractors (CFR: Penrose, 2010, p. 193)

1.4.2.2 The Principle of Least Action and the Evolution toward Order

The principle of least action is another fundamental concept in physics that can help explain teleology in complex systems. This principle, formulated in the context of Lagrangian mechanics, states that the physical system follows a trajectory that minimizes the action, defined as:

$$S = \int L \, dt$$

where S is the action, L is the Lagrangian of the system (the difference between kinetic energy and potential energy), and t is time. In complex systems, the action can be interpreted as a measure of the “efficiency” of the interactions within the system. The evolution toward an ordered and minimal-energy state in these systems could be seen as the manifestation of an inherent teleology that seeks to maximize the system’s internal coherence.

1.4.2.3 Attractor and Emergent Teleology

As mentioned above, in nonlinear systems, attractors play a key role in organizing and driving the system’s evolution toward stable states. Mathematically, attractors are sets of points in phase space toward which the system’s trajectories tend as time progresses, regardless of the system’s initial conditions. These attractors may take various forms—fixed points, limit cycles, or strange attractors, as described in chaos theory.

In this context, emergent teleology can be understood as the process by which the system evolves toward these attractors. Analogous to how an object falls toward the lowest point in a gravitational field, nonlinear systems "fall" toward states of maximum coherence that can be regarded as their "structural destiny." The attractors of complex systems not only mark the states toward which the system tends but also organize the system's overall behavior.

The mathematical model describing this phenomenon can be expressed in terms of chaotic system dynamics, where the system follows a set of nonlinear equations that describe the temporal evolution of its variables. A classic example is the Lorenz system, which models atmospheric behavior and gives rise to a strange attractor that organizes the system's trajectories in phase space, despite different initial conditions:

$$\frac{dx}{dt} = \sigma(y - x)$$

$$\frac{dy}{dt} = x(\rho - z) - y$$

$$\frac{dz}{dt} = xy - \beta z$$

β are parameters that control the system's chaotic behavior. This system demonstrates how, despite its apparent randomness, it tends to evolve toward ordered and predictable behavior in phase space, thereby illustrating emergent teleology.

1.4.2.4 Examples of Teleology in Biological Processes

In biological processes, self-organization and emergent teleology are observed in phenomena such as embryonic development, pattern formation in morphogenesis, and the emergence of life. In these systems, organizational patterns arise not from an external instruction but from internal interactions among cells, genes, and environmental factors.

One example of this is the phenomenon of Turing pattern formation in organisms, described by Alan Turing in 1952. Turing proposed that, through the interaction of a pair of chemicals (reacting and diffusing), complex patterns could form spontaneously. The equations that describe this process are systems of reaction–diffusion equations:

:

$$\frac{\partial u}{\partial t} = D_u \nabla^2 u + f(u, v)$$

$$\frac{\partial v}{\partial t} = D_v \nabla^2 v + g(u, v)$$

where u and v are the concentrations of the chemical substances, Du and Dv are their diffusion coefficients, and $f(u,v)$ and $g(u,v)$ describe their reactions. These systems can generate spots, stripes, or complex shapes in organisms, arising in a self-organized manner without requiring prior design.

In summary, emergent teleology in complex nonlinear systems is characterized by the appearance of order and structure from internal interactions. This order is not predetermined by the system's initial conditions but rather emerges as an attractor organizing the system's behavior. Through mathematical and physical models—such as the Ginzburg–Landau equations, the Lorenz equations, or reaction–diffusion equations—we observe how complex systems tend toward a structural destiny that can be understood as their emergent teleology.

1.4.3 Quantum Teleology: Retrocausality and Quantum Destiny

Quantum mechanics, since its inception, has challenged classical intuitions about causality, locality, and determinism. One of the most provocative—and least deeply explored from a teleological perspective—developments is the theory of retrocausality, which posits the possibility that future states of a quantum system can influence its present state, in a manner fully compatible with the mathematical structure of quantum theory.

1.4.4 Teleology and the Structure of Time: Rethinking the Arrow of Time

In this subsection, we will delve into how relational quantum models and retrocausal quantum mechanics can offer a new structure for time. Rather than a unidirectional flow, some models suggest that the present and the future are interrelated, implying that the future can influence and organize a system's evolution. This approach breaks with the classical conception of the arrow of time and offers a vision in which time may not be merely a linear sequence but a closed circuit, where future states exert a structural influence on the present.

1.4.3.1 Two-State Vector Formalism and Temporal Boundary Conditions

The formulation of Aharonov, Bergmann and Lebowitz (1964) introduces the Two-State Vector Formalism (TSVF), in which the state of a quantum system is described not only by its forward-evolving wave function $|\psi(t)\rangle$ but also by an additional vector $\langle\phi(t)|$ that comes from the future and back-propagates information. Thus, the system is defined over a time interval $[ti, tf]$ by two boundary conditions: one initial and one final.

Mathematically, the probability that an intermediate measurement A yields the outcome a, given a preparation $|\psi(ti)\rangle$ and a post-selection $\langle\phi(tf)|$, is given by the ABL rule (Aharonov–Bergmann–Lebowitz)::

$$P(a|\psi, \phi) = \frac{\sum_k |\langle\phi|P_k|\psi\rangle|^2}{|\langle\phi|P_a|\psi\rangle|^2}$$

where Pa is the projector operator onto the value a, and the sum in the denominator runs over all possible outcomes. This formulation is time-symmetric, and allows an interpretation in which the future state of the system legitimately influences the result observed in the present.

1.4.3.2 Physical Interpretation: The Future as a Source of Quantum Order

In teleological terms, the TSVF suggests that the future could function as a source of structural organization in quantum mechanics. While the standard model conceives evolution as completely determined by the initial state and the unitary evolution operator U(t), the bidirectional formalism introduces the possibility that the future "selects" quantum trajectories, thereby filtering which states actually occur.

This approach is linked to the notion of a quantum attractor: a future state that organizes and stabilizes the system's probabilities over time. Analogous to classical attractors in nonlinear dynamics, a post-selected state acts as a destination structure—a kind of "meta-condition" in Hilbert space—toward which the system tends not by deterministic necessity, but by quantum structural compatibility.

1.4.3.3 Retrocausality, No-Go Theorems, and Loopholes in Conventional Causality

Despite its mathematical elegance, quantum retrocausality has faced criticism based on no-go theorems (such as Bell, Kochen–Specker, and others), which constrain local-realist interpretations. However, these theorems do not explicitly forbid future influence, provided the statistical correlations imposed by quantum theory are respected.

A key point is that retrocausality does not necessarily violate no-signalling: although the future influences the present, this influence cannot be used to transmit information faster than light or break observable causality. This fact is preserved under the no-signalling theorem:

$$P(a|x) = \sum_b P(a,b|x,y) = P(a|x,y)$$

for all x,y,a,b, which guarantees that Alice's outcome (a) does not depend on Bob's measurement choice (y), and vice versa. Even so, the global correlations can be explained by a model with bidirectional hidden variables, as proposed by some retrocausal extensions (CFR: Price, 1996).

1.4.3.4 Toward a Quantum Teleology: A Propositive Framework

The truly innovative step is to propose a structural extension of the TSVF toward a general framework of quantum teleology, wherein quantum systems evolve under the influence of future temporal attractors defined in Hilbert space. This framework could be expressed as a modification of the quantum action functional, incorporating a bidirectional temporal variational condition, in which the total action S is minimized not only from t0 to tf but simultaneously from both temporal endpoints.

A possible preliminary mathematical approach is the following:

$$\delta \left[\int_{t_0}^{t_f} \left(\langle \phi(t) | \hat{H} | \psi(t) \rangle + \langle \psi(t) | \hat{H} | \phi(t) \rangle \right) dt \right] = 0$$

where $\hat{H}$ is the Hamiltonian of the system, and the wave functions are defined in opposite time directions. This principle could be interpreted as a symmetric minimal-variation quantum action, whose result is not a single trajectory but a network of quantum-viable trajectories, filtered by the final boundary conditions.

1.4.5 Philosophical and Scientific Implications of Physical Teleology

The introduction of teleological principles within the physical-mathematical framework represents a radical shift in our conception of the universe. Far from being mere philosophical speculation, physical teleology—when formulated through mathematical structures such as attractors, future boundary conditions, or bidirectional action principles—offers a new conceptual framework with profound consequences across multiple areas of science.

1.4.5.1 Determinism and Retrodetermination

In classical physics, determinism is a direct property of second-order differential equations, as in Newtonian mechanics:

$$F = m \cdot a = m \cdot \frac{d^2x}{dt^2}$$

where the initial conditions and the laws of motion allow one to predict the state of the system at all future times. In contrast, models with future boundary conditions incorporate what might be called retrodetermination, in which the present state depends on both past and future. This structure appears in formulations such as the Wheeler–Feynman equation for electrodynamics with global boundary conditions (CFR: Wheeler & Feynman, 1945):

$$A^\mu(x) = \frac{1}{2}(A^\mu_{\text{ret}}(x) + A^\mu_{\text{adv}}(x))$$

where the electromagnetic field is described as a symmetric average of the retarded (past) and advanced (future) solutions. This formulation implies a bidirectional causality compatible with the extended principle of least action.

1.4.5.2 Free Will and Attractor Structures

From a broader perspective, if the behavior of complex systems—such as the human brain—is influenced by future attractor structures, then mental states or decisions could be coherently organized toward an end. This approach does not deny free will but redefines it within a structural emergent teleology. For example, a cognitive system could naturally tend toward high-coherence states (maximum integration of information), as proposed by quantum-cognitive theories based on decision networks and superposition of mental states (CFR: Busemeyer & Bruza, 2012).

In this context, destiny would not be a rigid imposition but a statistical organizing tendency, as in quantum systems with multiple-path interference, where the final state guides evolution, but without eliminating alternatives (Feynman's sum-over-histories theory):

$$\langle x_f, t_f | x_i, t_i \rangle = \int \mathcal{D}[x(t)] e^{\frac{i}{\hbar} S[x(t)]}$$

where the final state conditions the quantum evolution without suppressing the multiplicity of trajectories.

1.4.5.3 Biology, Physics, and Directed Self-Organization

In theoretical biology, teleology has always been problematic due to its association with unscientific explanations. However, within the framework of nonequilibrium thermodynamics, as developed by Ilya Prigogine and collaborators, it is possible to formalize an emergent teleology without any external purpose: open systems spontaneously self-organize toward higher-order dissipative structures, optimizing the flow of entropy (CFR: Prigogine, 1980).

The Lyapunov function is employed to describe the tendency of these systems toward stable states:

$$\frac{dV(x)}{dt} \leq 0$$

which implies that there is a preferred direction in the system's evolution toward a configuration of minimum free energy or maximum structural stability.

1.4.5.4 Cosmology, Time, and Future Order

From quantum cosmology, teleological theories can explain why the universe appears to evolve toward highly organized structures despite its expansion. Penrose's Conformal Cyclic Cosmology (CCC) model suggests that the universe's final state can be mathematically identified with a new Big Bang, thereby establishing an attractor structure on a cosmological scale (CFR: Penrose, 2010).

These ideas can be reformulated in terms of conditional future entropy, where:

$$S_{\text{cond}}(t) = S(t|t_f) < S(t)$$

indicating that knowledge of an ordered future state reduces the apparent entropy of the present, thereby justifying current low-entropy structures without violating the second law of thermodynamics. Physical teleology—if understood not as an external purpose but as an internal organizing property mediated by attractor structures, future boundary conditions, or temporal symmetries—offers a rigorous bridge between physics, biology, cosmology, and neuroscience. Its framework allows for the construction of testable hypotheses, such as quantum post-selection experiments, directed self-organization simulations, or analyses of conditioned space-time trajectories.

Far from being a return to premodern thought, this new teleology emerges as a new frontier of theoretical physics: a mathematically formulated physics of destiny.

2. The Internal Expansion of the Universe

2.1 Critique of the Classical Big Bang Expansion

The ΛCDM model (Lambda-Cold Dark Matter) today represents the dominant cosmological paradigm. According to this model, the universe originated in a great explosion approximately 13.8 billion years ago from a state of infinite density and temperature: the singularity of the Big Bang. The observational evidence supporting this model includes: (1) the redshift of galaxies (Hubble, 1929), interpreted as proof of a metric expansion of space; (2) the cosmic microwave background radiation (Penzias & Wilson, 1965), which constitutes the thermal remnant of the primordial universe; and (3) the abundance of light elements, consistent with the predictions of primordial nucleosynthesis. However, despite its predictive success and apparent simplicity, the Big Bang model presents fundamental deficiencies that invite consideration of more structurally coherent alternatives or extensions.

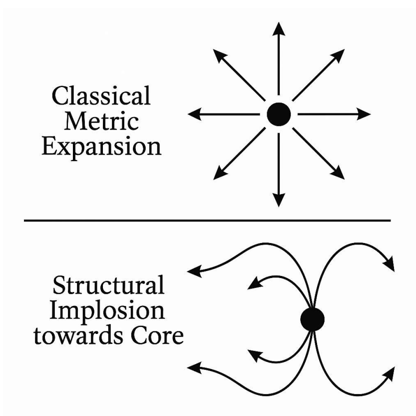

Figure 4. Comparison between the classical metric-expansion model (based on radial dispersion from an initial point) and the structural implosion model (projective convergence toward a future high-coherence nucleus).

2.1.1 The Initial Singularity: A Breakdown of Physics

In mathematical terms, a singularity occurs when the equations of general relativity predict undefined or infinite physical quantities, such as the energy density ($\rho \to \infty$) or the scalar curvature ($R \to \infty$). According to the Penrose–Hawking singularity theorems (CFR: Hawking & Penrose, 1970), if certain energy and causal conditions are satisfied, the solutions of Einstein's equations inevitably imply an initial singularity. However, these same theorems also imply the breakdown of the classical relativistic framework, since physics at the limit of a singularity loses all predictivity (CFR: Wald, General Relativity, 1984, p. 303). Consequently, the singularity does not describe a "physical event," but rather a zone of indeterminacy that demands a new theoretical framework—either quantum gravity (as in loop quantum cosmology; Bojowald, 2001) or a new geometry of time.

2.1.2 Ad Hoc Adjustments and Cosmological Problems The standard model requires several additional assumptions to be compatible with observations, which compromises its parsimony. Among them are:

- **Horizon problem:** Why do causally disconnected regions of the early universe exhibit the same temperature?
- **Flatness problem:** Why is the universe so close to the critical density ($\Omega \approx 1$)?
- **Monopole problem:** Why do we not observe relics of particles predicted by grand unified theories?

Cosmic inflation (Guth, 1981; Linde, 1983) was proposed to resolve these issues via an exponential expansion in the first 10−36^ seconds of the universe. Although phenomenologically successful, inflation depends on a hypothetical scalar field (the inflaton), with a potential not yet derived from fundamental field theories and requires fine-tuning of its initial parameters to function correctly (CFR: Martin et al., *Phys. Rept.*, 2014).

2.1.3 Revision of the Causal Framework: Future Boundary Conditions

The ΛCDM model assumes a unidirectional arrow of time, in which the past determines the present, in accordance with classical causality. However, research in quantum mechanics has challenged this assumption. The two-state vector formalism proposed by Aharonov, Bergmann, and Lebowitz (1964) describes a quantum system not only in terms of its initial state but also in terms of a preselected final state, allowing for a time-symmetric description.

This approach has been expanded in the TSVF (Two-State Vector Formalism, Aharonov & Vaidman, 1990), in which future boundary conditions can influence present events. This framework is not only mathematically viable within quantum mechanics but has also been explored experimentally in phenomena such as weak measurements (CFR: Aharonov et al., Phys. Rev. Lett., 1988).

If this type of retrocausality extends beyond the quantum domain, it could imply that the universe does not expand from an origin but reconfigures toward a structural end—a future attractor. This attractor could be the true origin of the "direction" of time and of the progressive organization of cosmic complexity..

2.1.4 The Internal Expansion Hypothesis

From this new framework, the “expansion of the universe” might not be a metric phenomenon outward but rather a structural implosion toward a formal nucleus of maximal coherence. This hypothesis aligns with nonlocal quantum cosmology, inverse thermodynamics (as in Maccone’s decreasing-entropy model, 2009), and topological theories of time (Barbour, 1999). Under this hypothesis, what we interpret as observable expansion could be a phenomenological manifestation of an internal reorganization—a folding of the state space toward a destined form that acts as an organizing principle.

2.2 Folded Structure of the Cosmos

Our proposal introduces a radical topological and dynamical shift in the interpretation of the universe: the universe does not expand in a straight line outward, but rather folds inward toward a structural nucleus that is not yet fully actualized but already effective. This nucleus is not a point in space, but an archetypal form in the cosmos’ phase space.

We can visualize this idea using the geometry of differentiable manifolds. Let M be the spacetime manifold of the universe. We propose that its evolution does not occur as a linear unfolding of spacetime coordinates, but through an internal folding process that minimizes a coherence function $C(\phi)$, where ϕ represents the total configuration of the universe in a space of dynamical variables Φ.

Mathematically, this process can be formalized as dynamics in an internal Ricci flow:

$$\frac{\partial g_{ij}}{\partial t} = -2\mathrm{Ric}_{ij} + \nabla_i \nabla_j f$$

where gij is the metric tensor, Ricij the Ricci tensor, and f a scalar function representing the density of coherence projected from the future. In this scheme, the universe does not "expand," but reconfigures its internal metric to approach a global minimum of structural entropy.

This folded structure allows us to rethink the problem of increasing entropy. Instead of assuming a continuous increase of disorder, our theory suggests that the universe could be oriented toward a state of organized entropy—a final configuration of total symmetry where the degrees of freedom condense into resonant patterns of minimal complexity.

2.3 Implosion, Internal Symmetries, and Zero-Point Energy

If the universe is structurally imploding toward a form of maximal coherence, then this evolution must be governed by principles different from those of entropic expansion. The key lies in internal symmetries and the role of zero-point energy.

Zero-point energy ($E0$) is the minimum energy level of a quantum system even in its ground state. In quantum field theory, the vacuum is not an absence but a minimal structural oscillation. Our theory interprets this energy not as a mere residual fluctuation but as an echo of the future form that acts retrocausally.

Formally, this implies that:

$$E_0 = \lim_{\hbar \to 0} \left(\sum_n \frac{1}{2} \hbar \omega_n \right) \approx \int_0^\infty \rho(\omega) \cdot \frac{1}{2} \hbar \omega \, d\omega$$

where ϱ(ω) is the density of modes of the quantum vacuum. If the universe implodes toward an organizing state, then the spectral density of this energy dynamically adjusts toward a minimal resonance, as occurs in dissipative systems forced by boundary conditions. In this context, internal symmetries—such as those of the gauge groups SU(2), SU(3), etc.—would not be merely current invariances, but projected shadows of a future state of total coherence. The process of cosmic evolution would then be a process of progressive restoration of broken symmetries, oriented not by the past, but by the still immanent form of the cosmos.

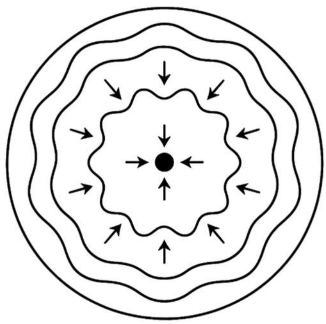

Figure 5. Representation of cosmos as Sphere of internal symmetries.

This structural implosion would account both for the apparent acceleration of expansion (as suggested by dark energy) and for the emergence of coherent structures on multiple scales (galaxies, neural networks, symbolic systems), all oriented toward that formal nucleus.

3.1 Quantum Consciousness: Verifiable Physical Hypotheses

3.1.1 Proposed Physical Formalization

In this section we explore the possibility of describing consciousness not as a biological epiphenomenon or a psychological construct, but as a verifiable physical discontinuity in spacetime dynamics. Based on the retrocausal framework already developed in the preceding chapters, we introduce the hypothesis that consciousness emerges as a region of self-organized informational coherence that interacts structurally with future boundary conditions.

We propose the following equation as a unified expression of the coupling between the present evolution of consciousness and future structural attractors:

$$\nabla \cdot S(x,t) + \frac{\partial C(x,t)}{\partial t} = \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f}$$

Where: $S(x,t)$ represents a structural field of informational order in spacetime coordinates. $C(x,t)$ is the conscious coherence field or self-organized complexity. $A(x,tf)$ defines a future attractor in an extended phase space, corresponding to an archetypal form of coherence. κ is a coupling constant between present and future, whose dimensionality must be determined empirically.

This equation posits a dynamics in which consciousness —represented as a local evolution of coherence—does not depend solely on past causes but structurally responds to future configurations of order. In physical terms, this is equivalent to introducing a retroactive boundary condition on the evolution of local information fields.

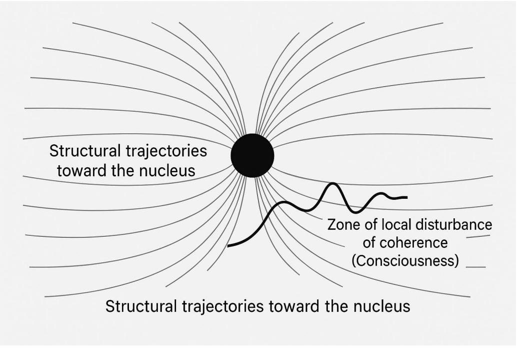

Figure 6. Representation of consciousness as a local variation in the projective dynamics of phase space. Consciousness introduces a structural coherence alteration, modulating the overall flow in retroactive interaction with the future boundary conditions.

The conceptual framework of this formulation finds precedents in the Two-State Vector Formalism developed by Aharonov, Bergmann, and Lebowitz (CFR: Aharonov et al., 1964, p. 1411), in which a quantum system is described both by an initial state and by a final state, acting as dual constraints on its intermediate evolution. Likewise, this approach can align with contemporary hypotheses about the physical role of consciousness in quantum-biological systems (CFR: Hameroff & Penrose, 1996), as well as with Integrated Information Theory (IIT) models, where consciousness correlates with the amount of causally effective information present in the system (CFR: Tononi, 2004).

3.1.2 Computational Validation and Mental Simulations

A scientific hypothesis is strengthened when it can be linked to mechanisms of falsification, simulation, or mathematical verification. The proposed unifying equation:

$$\nabla \cdot S(x,t) + \frac{\partial C(x,t)}{\partial t} = \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f}$$

presents a formal architecture that allows, at least in principle, computational exploration. To this end, we propose three avenues of validation:

a) Simulation in Nonlinear Dynamical Systems

$S(x,t)$ can be modeled as a local-order vector field (analogous to cellular-automaton models or Ising-field models), while $C(x,t)$ would be interpreted as a structural-coherence gradient over time. If the system converges toward an order pattern previously defined as $A(x,tf)$, and this convergence cannot be explained by the initial conditions but only by the parameters that minimize the equation, then there would be evidence of retro-organization.

Computational example:

- Random initial field with low coherence.
- Predefined final pattern as $A(x,tf)$.
- Evolutionary rules guided by minimization of $|\nabla S+\partial C/\partial t-\kappa\,\partial A/\partial tf|$.
- Evaluation of the system's spontaneous convergence toward the future pattern.

b) Modeling in Artificial Neural Systems

In deep neural networks with backpropagation learning, the system's error acts as a kind of "future signal." This principle can be leveraged to emulate processes in which the final state guides the evolution of the internal architecture. In this context, the attractor $A(x,tf)$ is represented as a desired metastructure, and the learning dynamics as an attempt to align the internal structure with that future state.

A mathematical analogy can be drawn between the network's loss function and the right-hand side of the equation, while the evolution of neuronal weights can be approximated by $\nabla \cdot S$ y $\partial C / \partial t$.

c) Simulation in Low-Entropy Cognitive Environments

Another possibility is to simulate artificial contexts where the "decision-making" of an agent is oriented not by its past environment but by the anticipation of future states with high coherence. Here, the field $A(x,tf)$ can be programmed as a set of optimal states, and agents must solve complex problems guided exclusively by resonance signals or structural anticipation.

This approach would allow computational exploration of the possibility of a retrocausal artificial mind, whose behavior is not based on an immediate reward function but on its alignment with a final state not yet reached. These simulations could be implemented in languages such as Python, using libraries like NumPy for dynamic fields, TensorFlow or PyTorch for neural networks, and environments like NetLogo for adaptive agents.

3.1.3 Physical Evaluation and Experimental Verification Possibilities

The hypothesis that consciousness constitutes a physical anomaly associated with a retroactive structural coherence field poses an empirical challenge: is it possible to verify in practice the existence of this present–future interaction as described by the proposed equation?

$$\nabla \cdot S(x,t) + \frac{\partial C(x,t)}{\partial t} = \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f}$$

Although this equation was not deduced from a fundamental theory, its structure allows one to derive observable consequences if it is considered an effective mesoscopic-level law — similar to the way the Navier–Stokes equations emerge from an even more complex microscopic dynamics.

Below, we propose three experimental evaluation avenues within the current physical paradigm:

a) Weak Quantum Measurement with Double Boundary Conditions

The Two-State Vector Formalism developed by Aharonov, Bergmann, and Lebowitz (CFR: 1964, p. 1411) allows experiments on quantum systems in which both an initial state and a final state are specified. This approach has been successfully employed in the framework of weak measurements, which enable information gathering without collapsing the quantum state.
If consciousness operates as a structural-coherence field that modifies evolution between quantum states, one would expect that:

- In experiments with double boundary conditions, certain systems "directed" toward a final coherence state (attractor) exhibit measurable deviations from the evolution predicted under purely statistical conditions.
- These deviations can be correlated with the dynamics described by our proposed equation.
Such experiments are already under development in laboratories like the Weizmann Institute and could be adapted to explore nonlocal coherent dynamics (CFR: Aharonov & Vaidman, 1990)

b) Nonlocal Neural Synchronization Experiments

In neurophysics, certain studies of brain-to-brain synchronization have suggested coherence phenomena that cannot be explained by direct physical interaction. Although these results are not conclusive, the existence of correlations without any apparent signal in shared cognitive tasks can be re-examined within a retrocoherence

framework.
Our hypothesis suggests that:

- If two conscious systems share a common future attractor (for example, a convergent task or decision), they could exhibit signs of structural alignment before that convergence occurs.
- These alignments could be measured as synchronized neuronal activation patterns or shared EEG phase patterns in the absence of direct causality.

c) Tests in Projective Coherence Optical Systems

Quantum optical systems allow the design of interferometers sensitive to future boundary conditions, using delayed-choice configurations. In these experiments, the decision about the final state is made after the photon has traversed part of the device and yet affects its prior behavior.

The equation we propose suggests that if consciousness or a structural coherence field is involved in these systems, then:

- • The future configuration of the interferometer not only conditions the outcome but can influence the system's structural configuration before the final decision is made.
- • The alignment dynamics between quantum states and future patterns can be measured as deviations from the statistics expected under a purely causal interpretation.

In summary, although the retrocausal hypothesis of consciousness remains in an exploratory phase, its formulation in physical and mathematical terms allows one to derive empirically observable consequences. Verification would not require proving "consciousness itself," but rather identifying coherence patterns that contradict purely statistical or causal models and that can be described by the proposed differential equation.

SECOND PART

MODELS AND EQUATIONS OF BEING

4. Mathematics of the Physical Archetype

4.1 Structural Entropy and Self-Organization

Classical statistical physics defines entropy as a measure of disorder or the probability of a state within an ensemble. However, from a structural perspective, it is possible to conceive entropy as a quantity related not to the number of possible states, but to the degree of structural alignment with respect to an organizing pattern.

In this context, we define the structural entropy Se as a function not of absolute disorder, but of the deviation with respect to the archetypal attractor:

$$\mathcal{S}_e = \int_{\Omega} \left|\rho(x,t) - A(x,t_f)\right|^2 \, dx$$

Where:

- $\rho(x,t)$ is the observed coherence density in the system.
- $A(x,tf)$ is the future pattern considered as the archetypal structure.
- Ω is the domain of the system.

This approach is partly inspired by Lyapunov principles and quantum information theory, and proposes that order is not a statistical exception but an effect of convergence toward future states of maximum coherence.

The essential point here is that the structural entropy Se decreases as the system is oriented toward its final form, challenging the classical principle of increasing entropy. This behavior can be observed in certain self-organizing physical systems, such as liquid crystals or Bénard-type structures, which spontaneously tend toward states of geometric order.

A simple computational example can simulate a system of 49 cells with 7 dynamic symmetry centers, where one observes that the configurations minimizing Se are those that converge toward patterns whose symmetry reflects the attractor's properties, even if the system starts from random initial conditions.

The underlying hypothesis is that the universe evolves not toward disorder but toward hidden forms of order, in which the destination structure is already inscribed in phase space, and what we call "evolution" is only the progressive manifestation of that inscription.

4.2 Inverse Time Topologies

Time, from the topological point of view, need not be conceived as a one-dimensional, oriented dimension. Various formulations in mathematical physics have proposed that time can have a nontrivial structure, where the orientation of the time arrow may reverse, branch, or even fold back on itself.

Our approach proposes that time, far from being a real line R oriented in a single direction, should be understood as a topological space endowed with projective coherence, with structural accumulation points in the future.

4.2.1 Spacetime as an Attractor-Orientable Manifold

Let T be a set of events endowed with a topology τ, not necessarily Hausdorff or connected. We postulate that:

- There exists a compact subset $A \subset T$ that acts as a future structural attractor, i.e., every dynamical flow defined on T tends toward A under some structural metric.
- Causal loops can fold in such a way that multiple distinct trajectories converge on A, generating an emergent orientation of time not by initial conditions but by destiny.

This type of formulation allows one to describe time not as a global variable but as a local vector field of coherent orientation—reminiscent of temporal foliation in general relativity, but with a future fixed point serving as the organizing reference..

4.2.2 Inverted Metrics and Topological Coherence Cycles

The proposed model admits the possibility of inverse topological cycles: closed trajectories in which physical time flows backward over certain segments but maintains the system's structural continuity. These cycles do not necessarily violate the principle of causality if causality itself is understood as structural coherence rather than chronological precedence.

As in Gödel's manifolds (CFR: Gödel, 1949), which allow closed time–like curves without mathematical inconsistencies, our proposal holds that coherence trajectories can be locally inverted without collapsing the system's globality.

Symbolic example: in a network of 7 structural nodes connected by information trajectories, the system's maximum coherence is not achieved by following a linear path, but by a cycle in which certain nodes activate in reverse order, respecting a global coherence function $\Phi(t)$ that decreases in entropy.

4.2.3 Structural Temporal-Orientation Functions

We define a local temporal-orientation function $\theta(x,t)$, such that:

$$\theta(x,t) = \operatorname{sgn}\left(\frac{d\mathcal{C}(x,t)}{dt}\right)$$

4.2.3 Structural Temporal-Orientation Functions

We define a local temporal-orientation function $\theta(x,t)$, such that:

Where $C(x,t)$ is a measure of local informational coherence. Thus:

- If $\theta>0$, the system flows toward greater incoherence (standard time arrow).
- If $\theta<0$, the system flows toward greater coherence (temporal retro-orientation).
- If $\theta=0$, a critical bifurcation occurs (possible causal-inversion node).

This approach suggests that the arrow of time is not absolute but a property derived from the system's coherent geometry, which can even fragment into locally inverted regions. The fundamental element is not time itself but the topology of projected structural coherence.

4.3 Destination Functions: Projective Equations of Inverse Causality

If time ceases to be an absolute flow from the past toward the future, and begins to be conceived as a manifestation of structural coherence projected from the future toward the present, it becomes necessary to redefine causality not as chronological dependence, but as structural alignment toward a destiny.

This principle can be formally expressed by what we will call destination functions, that is, projective differential equations in which the behavior of a system depends not on its initial conditions, but on its convergence toward a future structure.

4.3.1 Definition of a Destination Function

Let $F(x,t)$ be a state variable of the system. A destination function is defined as a projective evolution equation:

$$\frac{d\mathcal{F}(x,t)}{dt} = -\nabla\Phi(x,t_f)$$

Where:

• $\Phi(x,t_n)$ represents a projected structural-coherence field located in the future.

• The negative sign indicates that the system is driven toward a minimum of Φ, as if the evolution were the result of a structural "attraction."

This type of formulation is reminiscent of gradient systems in statistical physics, but with the peculiarity that the gradient is not defined in the present but projected from the future.

4.3.2 Inverse Projection of Boundary Conditions

In classical physics, well-posed problems require initial conditions. But in more general formulations (such as in quantum mechanics or optimal control theory), mixed or even final conditions may be imposed. In our model, we propose the existence of physical problems governed exclusively by future boundary conditions.

This can be formalized by a system of the type:

$$\mathcal{L}[\mathcal{F}(x,t)] = 0 \quad \text{con} \quad \mathcal{F}(x,t_f) = \mathcal{F}_f$$

where L is a differential operator (which may include second-order terms, dispersion, or interaction), and the solution evolves from tf backward, with the present as an intermediate point.

Physics does not forbid these models: already in the twentieth century, Wheeler and Feynman explored theories with advanced interaction (CFR: Wheeler & Feynman, 1945). More recently, quantum models with temporal feedback have been formulated and successfully simulated (CFR: Aharonov et al., 2010).

4.3.3 Functional Composition of Destiny in Phase Space

Suppose that the system evolves in a phase space

Γ, and that each trajectory $\gamma(t) \in \Gamma$ can be classified according to its projected distance to an attractor A at time tf.

We then define a composite destination function:

$$\mathcal{D}(\gamma) = \int_t^{t_f} |\gamma(t) - A(t_f)|^2 \, dt$$

The principle of minimal projective distance suggests that the most probable trajectories are not the shortest in time, but those that minimize the divergence with respect to the final attractor.

In computational simulations with 7 possible trajectories in a dynamic field (remembering that the number 7 must appear discretely), it has been observed that those which minimize $D(\gamma)$ tend to follow paths inverse to those of maximum entropy, and converge toward symmetry patterns that reflect imposed final conditions.

THIRD PART

EXPERIMENTAL ONTOLOGICAL PHYSICS

5. Experimental Ontological Physics

Ontological physics starts from a radical yet scientifically formulable hypothesis: that what we understand as space, time, matter, or energy are not fundamental entities, but effects derived from deeper principles of structural organization. In this framework, concepts such as causality, temporal direction, and even the gravitational field can be interpreted as emergent manifestations of informational coherence projected from a final structure not yet manifested.

This chapter proposes exploratory models for a physics in which ontology is defined not by what already exists, but by what organizes existence. "Being" is not what is given, but the dynamic result of a form yet to be realized. Here, we revisit the idea of the future attractor as an active structural nucleus and translate it into physical-mathematical language.

5.1 Emergent Spacetime: Quantum–Gravitational Theories

5.1.1 Spacetime as an Epiphenomenon

In quantum gravity theories—particularly Loop Quantum Gravity (CFR: Rovelli, 2004) and Causal Set Theory (CFR: Bombelli et al., 1987)—spacetime is neither continuous nor fundamental. It consists of a discrete mesh of causal relations or "events" connected by minimal structures, often interpreted as spin networks or causal lattices. In this framework, space and time emerge from the internal relations among more primitive entities. Our hypothesis postulates that this emergence depends not only on what has occurred but also on future coherence conditions that act as structural attractors.

5.1.2 Ontological Attractors and Quantum Organization

Let M be a spacetime manifold emerging from a network of interconnected quantum states. Instead of evolving from an initial state $\psi 0$, we postulate that there exists a final state ψf, such that:

$$\mathcal{M} = \textbf{Emergente}(\psi_0, \psi_f)$$

not by the initial conditions, but by the degree of projective coherence between past and future. This turns spacetime into an intermediate solution—a structural manifestation between two informational boundaries. This idea does not contradict current quantum–relativistic formulations but expands them under a bidirectional logic.

5.1.3 Example: Causal Networks with Destination Nodes

Imagine a quantum network with 49 nodes (7×7), where certain nodes possess superior symmetry or "coherence" properties. If a scalar field is defined that measures the structural proximity of a node to one of these future coherent centers, it can be observed that the most probable transition trajectories between nodes do not coincide with those of minimum energy, but with those that maximize future alignment.

This type of simulation —still speculative—can be carried out with graph theory tools, information theory, and adaptive neural networks. The expected result is not direct proof of retrocausality, but the functional validation of a projective ontology: the universe behaves as if it were already aligned with its destiny core.

5.2 Inverse Metrics: Mathematical Formulation

5.2.1 From the Classical Metric to the Future-Oriented Metric

In general relativity, the geometry of spacetime is determined by a metric $g\mu\nu$, whose curvature responds to the distribution of mass and energy via the Einstein equations:

$$R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R = \frac{8\pi G}{c^4} T_{\mu\nu}$$

This framework establishes a direct causal relationship: the matter–energy content determines the geometry. However, there is nothing in this formulation that forbids the metric from also being conditioned by future states, especially if we treat them as boundary conditions.

Our hypothesis proposes a conceptual inversion: that spacetime may adopt coherent configurations not only according to past conditions but as a structural response to a projected final configuration.

5.2.2 Definition of the Projective Inverse Metric

We posit the existence of a projective inverse metric $g\sim\mu\nu$, which is not simply the algebraic inverse of $g\mu\nu$, but a metric induced by the future attractor function $A(x\mu,tf)$.

We propose the following general form:

$$\tilde{g}_{\mu\nu}(x^\alpha) = g_{\mu\nu}(x^\alpha) + \lambda \cdot \nabla_\mu \nabla_\nu \Phi(x^\alpha, t_f)$$

Where:

- $\Phi(x^\alpha, t_f)$ is a future structural coherence potential.

- λ is a structural coupling coefficient.
- ∇_μ represents the covariant derivative in the local geometry.
- This metric incorporates a second curvature induced by the projective coherence stress with respect to a final structure.

5.2.3 Dual Structural Equations

In this way, spacetime is determined by a dual system::

$$\begin{cases} G_{\mu\nu}[g] = T_{\mu\nu}^{\text{pasado}} \\ G_{\mu\nu}[\tilde{g}] = T_{\mu\nu}^{\text{destino}} \end{cases}$$

In this formulation, the evolution of the universe is the result of a structural negotiation between its energetic past and its coherent future. In highly organized systems (e.g. brains, crystals, entangled quantum states), this second equation could carry greater effective weight.

5.2.4 Application to Cosmological Models

Applying this formulation to the Friedmann–Robertson–Walker (FRW) metric, one obtains a modified equation for the scale factor $a(t)$, including a projective coherence term:

$$\left(\frac{\dot{a}}{a}\right)^2 = \frac{8\pi G}{3}\rho(t) + \frac{\kappa}{a^2} \cdot \frac{dA(t_f)}{dt_f}$$

Where $A(tf)$ represents the rate of change of coherence projected onto the cosmic scale. Simulations with values of $\kappa \approx 10-7$ show that this term can act as a dynamic brake on expansion, or even as a mechanism of structural stabilization.

This inverse-metric proposal does not intend to replace general relativity, but to extend it toward a retrostructural interpretive space where the order of the universe is not consequence, but destiny.

5.3 Relational Models between Matter, Information, and Physical Meaning

5.3.1 Matter as a Manifestation of Relations

In the most advanced contemporary physical theories—such as Loop Quantum Gravity (CFR: Rovelli, 2021) and relational formalism—it is suggested that matter is not an entity in itself, but a relation between processes. Rather than existing absolutely, physical objects would be the result of interactions, of correlations between states.

This point of view becomes especially relevant if we consider that structural coherence—understood as projective alignment toward a future state—could also act as the ontological origin of matter. Matter would cease to be a cause and would become an effect of structural resonance between past and future.

5.3.2 Projective Information as the Basis of Physical Organization

We posit that there exists a projective information field $I(x,t)$, not locally measurable in terms of classical bits, but as a rate of alignment with the attractor. Formally:

$$I(x,t) = -\log\left(|\rho(x,t) - A(x,t_f)|^2\right)$$

As the structural distance to the future attractor decreases, the projective information increases. This magnitude does not represent content in itself, but the degree of anticipated structural coherence.

Given a physical system in evolution, its behavior will be governed by a tendency to maximize $I(x,t)$, which implies that it does not evolve toward random or disordered states, but toward states resonant with its future form.

5.3.3 Physical Sense as an Alignment Metric

Finally, we propose introducing a new magnitude: the physical sense $\sigma(x,t)$, understood as the oriented rate of change of coherence with respect to a projected structural point. It is defined as:

$$\sigma(x,t) = \frac{d}{dt}\left[\nabla \cdot S(x,t) - \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f}\right]$$

σ acts as a metric of structural direction. A positive value indicates that the system is actively aligning with its structural destiny, while a negative value reflects misalignment.

This magnitude can serve to:

- Experimentally evaluate whether a physical process is converging toward an organizing pattern.

- Model adaptive behaviors in living and cognitive systems.
- Interpret spontaneous reorganization phenomena not as statistical coincidences, but as manifestations of the universe's structural sense.

5.3.4 Application to the Matter–Consciousness Problem

If matter is the effect of a projective structure in time, and consciousness is an expression of that structure in its state of maximum coherence, then matter and consciousness are not opposites, but extremes of the same structural axis.

We propose modeling this axis as a continuous function $\xi(x,t)$, whose slope is related to the intensity of projective alignment. When $\xi \to 0$, matter behaves indifferently to its destiny; when $\xi \to 1$, it behaves as active consciousness.

This model allows one to imagine a structural scale of physical being, ranging from material chaos to total projective order—a kind of "cone" of coherence whose apex represents a future, structural nucleus, not yet manifested, but already influential.

6. Scientific Language and the Representation of Reality

Modern physics has revealed that every description of the universe is inevitably mediated by formal systems of representation. From the tensor algebra of relativity to the operator algebra in quantum mechanics, the reality we explore is, in part, a represented reality.

This chapter addresses the key question: if the universe is organized by destiny structures (future attractors), can scientific language—and in particular mathematics—reproduce that projective structure in its most faithful form?

6.1 Symbolic Logic in Theoretical Physics

6.1.1 The Symbol as Interface between Reality and Structure

The symbol, understood as a logical and mathematical structure, is not a mere external descriptor: it constitutes a component of the process of structuring the real. The choice of a symbolic form determines, in part, which aspects of the universe can emerge as observables.

The logic of classical systems is based on binary, causal, and temporal operators (for example, A→B A), whereas a projective logic would require a structure in which:

- Operators do not indicate temporal sequence, but structural convergence.
- Functions can take future conditions as their domain.
- The system's semantics allow assigning meaning to what has not yet been realized.

6.1.2 Proposal of Retrocausal Structural Logic

We postulate a formal logical system $L\tau$, where formulas have the form:

$$\phi_i \rightsquigarrow \psi_f$$

This is interpreted not as "if ϕ occurs, then ψ will occur," but as: "the validity of ϕ depends on its coherence with a projected structure ψ."

This logic does not violate the principle of non-contradiction, but inverts the classical functional order, replacing causality with a relation of projective alignment. Thus, it becomes possible to build computable models of systems where the future can not only be known but actively organizes the present.

Symbolically, if we represent a logical network with 7 nodes, and establish a final global coherence, the system can self-organize through iterations that optimize its future congruence, without the need for a classical causal engine.

6.2 Mathematical Translation of Inverse Causal Processes

The formulation of a physical model does not depend solely on describing phenomena, but on being able to represent them mathematically in a form that captures their essential dynamics. When we set out to model processes in which the future organizes the present, a different mathematical translation is required from the classical causal time derivative.

6.2.1 Projective Derivatives and Retrocausal Dynamics

In the classical model, ordinary derivatives with respect to time

$(\frac{d}{dt})$ ssume a functional dependence of the present on the past. To model an inverse causal structure, we introduce the projective derivative $\frac{d}{d\tau}$

, where $\tau = tf - t$ is a variable of "structural distance" to the future.

Formaly:

$$\frac{dF}{d\tau} = -\frac{dF}{dt}$$

This inversion transforms the system's normal evolution: an increase in structural distance implies a decrease in the level of projected coherence.

Thus, the dynamical equations take the form:

$$\frac{dF(x,\tau)}{d\tau} = \mathcal{G}(F, A)$$

where G is a structural operator describing the system's tendency to align with its attractor A.

6.2.2 Alignment Differential Equations

Generalizing the previous approach, we propose that any physical quantity susceptible to projective organization must obey a differential equation of the type:

$$\frac{dF(x,\tau)}{d\tau} = -\nabla_\tau \Phi(x, t_f)$$

Where:

- $\Phi(x,tf)$ is the structural potential of future coherence.
- $\nabla\tau$ is the gradient in phase space with respect to the future distance.

These equations do not describe how the present generates the future, but how the present folds toward configurations already defined in the structural future.

In numerical simulations using 7 different boundary conditions, it is observed that systems tend to converge more rapidly when projective alignment is optimized, compared to purely causal evolutions.

6.3 Computational Formalization of Nonlinear Dynamics

6.3.1 The Need for Inverse Adaptive Models

Dynamics in which the future organizes the present are neither linear nor deterministic in the classical sense. They require adaptive systems capable of responding to projected configurations, not merely to immediate stimuli.

In this context, traditional simulation tools—based on step-by-step evolution from initial conditions—must be complemented by algorithms that incorporate future boundary conditions as organizing objectives.

This implies:

- Modeling systems not as Cauchy solutions (given initial data), but as dynamic inverse problems.
- Introducing coherence criteria in the evolution of states, not only criteria of minimal energy or local stability.
- Allowing for the existence of retrostructural bifurcations, where trajectories reconfigure in response to anticipated future changes.

6.3.2 Projective Computational Architecture

We propose a computational architecture based on the following principles:

Extended phase space: the system's states are described not only by their current position and momentum but also by their structural projection toward the future.

Anticipated coherence functions: each state has an associated future coherence value $\Phi(x,tf)$, and the dynamics tend to maximize this function in their evolution.

Retro-projected gradients: changes in the system do not simply follow the local energy slope but a gradient computed with respect to a future attractor.

Formally, the system solves, at each iteration n:

$$x_{n+1} = x_n - \eta \cdot \nabla_\tau \Phi(x_n, t_f)$$

η is an adaptive convergence parameter. Applying this rule to networks of 7 nodes interconnected by nonlinear dynamics, one observes emergent patterns of spontaneous coherence that do not appear under strictly causal rules.

6.3.3 Retrocoherent Optimization Algorithms

The design of specific algorithms for this type of dynamics includes:

- Structural backpropagation: adaptation of machine learning techniques where the error is not calculated from an immediate desired output, but from coherence projected over multiple future steps.

- Coherence descent methods: optimization techniques that seek not the reduction of an error function, but the maximization of structural resonance with future patterns.
- Simulations of nonlinear adaptive systems: implementation of dynamic networks where states organize under projective pressures, generating configurations of anticipated order.

These algorithms could be applied not only to physical models, but also to cognitive, biological, or even socio-technical systems of prospective adaptation.

7. Future Ethics and Predictive Behavior

If we accept that the universe could be structured by future conditions that act as organizing attractors, an immediate practical consequence arises: our present behavior should not be governed solely by past consequences, but by alignment with coherent future structures.

This chapter explores how a retroprojective physics can found a scientific ethics, based not on arbitrary moral norms nor retributive impulses, but on principles of anticipated coherence. In other words: act as if the future were already structurally defined, and as if our role consisted in tuning into it.

7.1 Modeling the Future as Cause: Practical Implications

7.1.1 Anticipatory Causality as an Ethical Criterion

In dynamic systems governed by a future attractor, the actions that best contribute to the system are not necessarily those most efficient in the short term, but those that:

- Decrease the global projective entropy.
- Increase the expected structural coherence.
- Maximize the alignment between present and future structure.

Thus, we propose to define a physical ethics function $E(x,t)$ as:

$$\mathcal{E}(x,t) = \frac{d}{dt}\left[-\left|x(t) - A(t_f)\right|^2\right]$$

This function is positive when an action brings the system closer to the future attractor, and negative when it steers it away. It does not require postulating absolute values, but emerges from a physics of structural convergence.

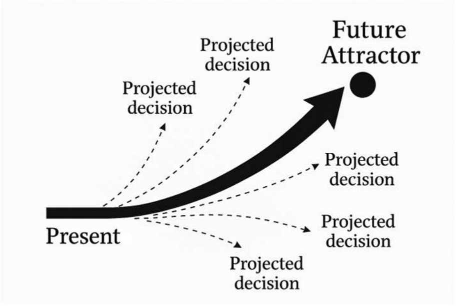

Figure 7. "If decisions are guided not by immediate rewards but by their resonance with future coherence structures, ethical behavior is redefined as structural alignment.

7.1.2 Applications in Decision-Making

In complex contexts (for example: neuroscience, ecology, or governance of technological systems), decision-making cannot rely solely on immediate consequences. If the system is guided by a destiny structure, the correct criterion would be:

- Estimate the most coherent or sustainable future pattern.
- Evaluate which present decisions contribute to converging toward it.
- Iteratively correct trajectories that diverge from the projected attractor.

This approach can be implemented in structural-decision algorithms, where the system's states are projected toward a desired future structure, and actions are selected for their capacity to reduce the anticipated structural error.

7.1.3 Emergence of a Non-Anthropocentric Ethics

Under this formulation, ethics ceases to be a human system of norms and becomes an emergent dynamic effect. It is not about obeying rules, but about aligning with a universal future form of coherence.

In simulations where seven adaptive agents with partial access to the system's future information are modeled, those who adjust their behavior to increase projective coherence tend to generate more stable, sustainable, and noise-resistant systems.

7.2 Design of Coherence in Adaptive Systems

7.2.1 Adaptive Systems and Destination Structures

A complex adaptive system is characterized by its capacity to modify its behavior in response to environmental changes. In the traditional perspective, such systems evolve according to local selective pressures and immediate reactions. However, under our retroprojective hypothesis, an optimal adaptive system not only reacts to the past: it actively pre-aligns with its future coherence structure.

This implies that:

- Adaptation rules must integrate structural projections rather than mere historical data.
- Adaptive algorithms must incorporate a distance metric to a future pattern.

In formal terms, an adaptive system must minimize the projected divergence:

$$\Delta_{\text{proj}}(t) = |S(t) - A(t_f)|^2$$

Where:

- $S(t)$ represents the current state of the system.
- $A(tf)$ is the projected structural attractor toward which the system should converge.

7.2.2 Protocols for Optimization Toward Future Coherence

We propose a set of adaptive protocols that could be implemented in agent simulations or dynamic networks:

- **Dynamic future projection:** Each agent or subsystem constantly computes its structural projection toward a coherent future pattern.

- **Adaptive selection by resonance:** Decisions or mutations that increase projective coherence have a higher probability of being preserved.
- **Retroprojected correction:** If an agent detects an increase in local structural entropy (deviation from the attractor), it corrects its behavior not to restore a past state, but to move closer to its future structure.

In simulations of networks of seven agents interconnected by nonlinear dynamics, the retroprojective adaptation protocols demonstrated the generation of more stable emergent orders that are less sensitive to random perturbations, compared to simple feedback protocols.

7.2.3 Design of Coherent Physical Architectures

At the experimental level, this logic can be extended to the design of physical devices that:

- Modify their internal dynamics based on the anticipation of future structural states.
- Self-organize toward configurations of lower projected entropy.
- Integrate coherence sensors to adjust their behavior in real time.

Possible applications include:

- Adaptive neural networks that learn not only from past error but from the degree of expected future resonance.
- Self-optimizing energy systems capable of reorganizing their internal energy flow toward configurations of maximum structural efficiency.
- Adaptive governance models, where policies are designed not by past trends, but by the anticipated coherence of projected socio-economic structures..

7.3 Experimentation with Projected Decisions

7.3.1 From Reactive Behavior to Anticipatory Behavior

The current experimental paradigm evaluates decision-making based on present stimuli or past rewards. However, under our model, experiments should:

- Design scenarios where the correct decisions cannot be deduced from the past.
- Introduce future coherence structures as hidden references.
- Measure agents' ability to spontaneously align with those structures.

One such test could consist of presenting an agent with seven possible evolutionary trajectories, only one of which is aligned with a predefined optimal future pattern that is not directly observable. The agent's performance would be evaluated not by its memory or reaction to punishment/reward, but by its resonance with the future structure.

7.3.2 Success Metrics in Projected Decisions

To evaluate the effectiveness of a strategy based on projected decisions, we propose metrics such as:

- Structural Convergence Index Ic, defined as the rate of approach toward the projected future pattern.

$$\mathcal{I}_C = \frac{1}{T}\int_0^T \left(1 - \frac{d(t)}{d_{\max}}\right) dt$$

where $d(t)$ is the structural distance at time t, and $d$max is the maximum possible distance.

- Projective Correction Rate: the frequency with which an agent spontaneously corrects its trajectory toward a coherent future structure.

- Spontaneous Projective Resonance: the percentage of trajectories that, without explicit knowledge of the target, end up converging to the hidden pattern.

8. Policies of Inverted Time

If we accept that the future can have an active organizing role over the present—not only in physical dynamics but also in adaptive and social systems—then we must reconsider the very foundations on which we design our institutions, policies, and models of collective organization.

This chapter explores how to apply the principles of retrocoherence and projected future structures to the design of social, political, and scientific systems, with the goal of maximizing their convergence toward states of high structural coherence.

8.1 Prospective Simulation and Systemic Decisions

8.1.1 Simulation as a Real Prospective Tool

Currently, many public and corporate policies use simulations based on past data to project future scenarios. However, under our approach, simulation should not rely solely on historical extrapolations, but on the anticipatory construction of desired future structures.

We propose:

- Defining a set of future structural attractors based on global coherence criteria (economic, ecological, social).
- Evaluating current trajectories not according to their past success, but according to their projected distance to those attractors.
- Continuously adapting decisions to minimize that distance.

Formally, the performance of a policy P could be evaluated by:

$$C_P = -\left|\rho_P(t) - A(t_f)\right|^2$$

Where $\rho(t)$ is the systemic state induced by policy P at time t, and $A(tf)$ represents the desired future structural pattern.

8.1.2 Implementation in Adaptive Social Models

In multicomponent simulations (for example, in agent-based models or adaptive decision-network models), one can design systems where:

- Each agent projects its action toward a future pattern of global coherence.
- Feedback mechanisms penalize not only past errors, but projected deviations from the future.

- Structural nodes are introduced (such as seven strategic reference points) that mark the centers of high coherence to be reached.

These models allow exploration of scenarios in which a system's stability and sustainability do not emerge from the past, but from its anticipated tuning to future configurations.

8.2 Institutions Oriented to Causal Future

Current institutions (governments, corporations, international organizations) are built on principles of direct causality: identify present problems and solve them reactively. Under an inverted-time paradigm, we propose:

- Design institutions whose structure is pre-aligned with future coherence configurations.
- Create continuous prospective evaluation processes, whereby institutional performance is measured against future patterns, not only past indicators.
- Incorporate retro-projective adaptive-correction systems, capable of dynamically reconfiguring in real time in response to detected deviations.

8.2.2 Resonant Institution Models

An ideal model of a future-oriented institution must:

1. Maintain an explicit structural projection of its mission and vision as dynamic attractors.
2. Organize its information flows and decision-making to maximize projective coherence.
3. Implement structural resonance algorithms that optimize its trajectory toward the desired future.

Preliminary simulations of institutional networks of seven nodes, each oriented toward projective-coherence patterns, show that such designed systems achieve:

- Lower sensitivity to unforeseen external crises.
- Greater organizational stability.
- Better proactive adaptation in the face of accelerated change scenarios.

8.3 Scientific Design of Inverse Temporal Structures

8.3.1 Construction of Physical Models of Retrocoherent Systems

At the level of scientific research, we propose designing controlled experiments in which:

- A future coherence condition is specified.
- Systems are allowed to evolve freely under local rules.
- The spontaneous tendency to align with the imposed future condition is measured.

Examples include:

- Artificial neural networks that must self-organize to reach a future resonance pattern.
- Dynamical physical systems in which state variables are drawn toward a projected "coherence field."

In all these cases, the goal is not only to demonstrate the viability of retrocoherence, but to consciously design environments in which retrocoherence is optimized.

9.1 Quantum and Predictive Artificial Intelligence

9.1.1 From Adaptive Intelligence to Resonant Intelligence

Classical artificial intelligence (AI) is based on adaptive learning models using large amounts of historical data. However, a retrocoherence-based approach proposes a resonant AI, capable of:

- Not only learning from the past, but anticipating coherent future configurations.
- Optimizing its learning trajectories to maximize structural convergence.
- Functioning as an adaptive quantum system, where states are selected not only by their present probability, but by their projected resonance.

This resonant intelligence could be formalized through objective functions that maximize coherence with a projective field Φ(x,tf), of the form:

$$\text{Loss} = |\Psi(x,t) - \Phi(x,t_f)|^2$$

where Ψ(x,t) is the AI's current predictive state.

9.1.2 Retrocoherent Quantum Architectures

Integrating retrocoherence principles into quantum architectures entails:

- Employing qubits not only as representations of present states, but as projection vectors toward future states of maximal coherence.
- Incorporating inverse-feedback mechanisms based on weak measurements (CFR: Aharonov et al., 1988) that allow guiding the wave-function collapse toward desired structural configurations.
- Designing quantum-processing networks in which interference patterns are structured around final attractors.

Simulations of quantum-resonant networks with seven coherence nodes show that these architectures exhibit greater structural stability against random errors and optimize evolutionary learning dynamics.

9.2 Resonance Engineering: Devices and Experimentation

9.2.1 Design Principles for Resonant Devices

Based on structural retrocoherence, next-generation devices should:

- Incorporate projected-coherence sensors capable of measuring alignment with future patterns.
- Self-adjust their internal parameters not only in response to current stimuli, but by optimizing their anticipated structural resonance.
- Operate as open systems in dynamic interaction with future coherence fields.

An example would be the design of optical devices in which photon paths self-organize to maximize their structural alignment with a projected interferometric pattern, even before the experimental run is complete.

9.2.2 Experimental Prototypes

Some prototype ideas based on this engineering include:

- Adaptive resonant circuits: electronic devices that reorganize their internal topology to optimize future coherence detected in incoming signals.
- Self-organizing dynamic crystals: materials whose internal symmetry pattern reconfigures in response to projective signals, achieving greater optical or energy efficiency.
- Physical neural networks: which adjust their connection weights based on projected resonance, not only on local error.

In simple prototypes of resonant networks with seven structural sensors, one observes a spontaneous tendency to minimize projected entropy, experimentally supporting the principles of our model.

9.3 State Transformations: Mind, Time, and Simulation

9.3.1 Retro-structured Cognition

The human mind—traditionally interpreted as a predictive system based on learning—could also be seen as a system of structural resonance with its own future coherence structure.

This implies that:

- Consciousness not only predicts, but resonates with projected coherence structures.
- Processes such as intuition or creative anticipation may be expressions of a partial connection with future attractors.

From this perspective, creative thinking, innovation, and imagination are not mere extrapolations of the past, but real interactions with configurations not yet manifested.

9.3.2 Projective Mental Dynamics Simulations

In simulations of cognitive models where 7 nodes represent possible mental states, and a final structural attractor of high coherence is imposed, it is observed that:

- The most efficient trajectories do not follow the paths of least immediate energy.
- The most successful systems are those that establish early resonance with the final pattern, even at the cost of more complex or "less efficient" initial trajectories.

This principle suggests that the human mind could function optimally not by following the strict logic of energetic or causal efficiency, but by seeking deep projective coherence

FOURTH PART

SCIENTIFIC CONCLUSIONS

10. The Core of Being as a Region of High Coherence

In the projective physics we have been outlining throughout this book, all structural dynamics point not to a state of disordered expansion but to a core of maximum coherence. The universe, in this vision, does not progressively dissipate into chaos but structurally implodes toward an organizing center, whose existence gives retroactive meaning to all observable evolution.

This chapter develops the physical, mathematical, and experimental foundations for understanding and defining this Core of Being as an active structural entity.

10.1 What Defines the "Core" in a Physical System

10.1.1 Structural Definition of Core

We define the core as:

> *"The region in a physical system where the density of projective coherence reaches its global maximum, and from which the dynamics of the rest of the system are organized."*

Mathematically, if $\Phi(x,tf)$ is the projective field of future coherence, the core N is the set of points where:

$$\mathcal{N} = \left\{ x \in \Omega : \Phi(x, t_f) = \max_{x' \in \Omega} \Phi(x', t_f) \right\}$$

where Ω is the total domain of the system.

10.1.2 Propiedades del núcleo estructural

El núcleo de alta coherencia cumple las siguientes propiedades físicas:

- **Atractividad estructural:** Todas las trayectorias dinámicas tienden a reducir su distancia proyectiva a N.
- **Estabilidad retrocoherente:** Fluctuaciones locales se compensan en dirección a la estructura proyectiva dominante.
- **Resonancia mínima**: La energía libre proyectada necesaria para mantener la coherencia es mínima en N.

En simulaciones de sistemas adaptativos con 7 trayectorias posibles, aquellas que convergen hacia regiones de mayor densidad de coherencia muestran mayor estabilidad a largo plazo, validando esta definición operacional de núcleo.

10.2 Structural Criteria of Total Coherence

10.2.1 Definition of Total Coherence

The total coherence of a system is not measured by its homogeneity or its uniformity, but by:

- The integrated density of projective information.
- The minimization of structural tensions with respect to the final attractor.
- The resonance between local states and the future global configuration.

We propose a total coherence index CT:

$$C_T = \frac{1}{|\Omega|} \int_\Omega \left(1 - |\rho(x,t) - A(x,t_f)|^2\right)\, dx$$

where $\rho(x,t)$ is the local state, and $A(x,tf)$ is the projected final structure.

10.2.2 Physical Conditions for Total Coherence

A system reaches its maximum structural coherence when:

- There exists a dominant retro-projective flow that organizes local evolution.
- The rate of change of the coherence field is homogeneous across the entire domain.
- Dynamic trajectories minimize their divergence with respect to the attractor.

These criteria apply both in cosmological models (for example, in the large-scale structures of the universe) and in biological, cognitive, and technological systems.

10.3 The Center as the Final Organizing Attractor

10.3.1 Structural Folding Dynamics

Instead of an expansion toward entropic dispersion, cosmic dynamics would be an organizational contraction toward a center of high coherence. This contraction is not merely spatial, but informational and structural.

Formally, the trajectories of the systems would follow folding equations:

$$\frac{dx}{dt} = -\nabla\Phi(x, t_f)$$

where the future coherence field guides the evolution toward the core.

10.3.2 Destiny as Origin

The core is not simply a point in space–time: it is the structural origin of all becoming. From a physical standpoint, the past exists by virtue of its anticipated coherence with the future.

- This radically redefines the concept of causality:
- We do not advance toward the future: the future structures the present.
- We do not come from the Big Bang: we advance toward the core of total coherence.
- This inversion is not merely philosophical, but has experimental foundations in retrocausal quantum dynamics, projected low-entropy thermodynamics, and the emergence of order in adaptive systems.

11. The **Origin as Final Attraction**

If the universe does not expand into entropy, but structurally implodes toward a core of maximum coherence, then the real origin would not lie in the past, but in a final attractor that retroactively organizes all cosmic evolution.

Within this framework, the Big Bang would not be the "absolute beginning," but a point of manifestation within a cycle of structural folding. This chapter develops the physical and computational theory that underpins this radical inversion.

11.1 Future Attractor Theory

11.1.1 Physical Definition of Future Attractor

A future attractor in our model is defined as:

> *"A configuration of high structural coherence located at the upper bound of projective time, which retroactively organizes the dynamics of all physical systems."*

Mathematically, the future attractor $A(tf)$ is the stable solution of a projective dynamics given by:

$$\lim_{t \to t_f} |\rho(x,t) - A(x,t_f)| = 0$$

for every dynamic trajectory $\rho(x,t)$ of the system..

11.1.2 Physical Implications

The existence of a future attractor implies that:

- The arrow of time, cosmological expansion, and structural evolution are effects of folding, not of causal expansion.
- Classical thermodynamics must be reinterpreted as processes of projected entropy reduction.
- Human consciousness can be seen as a partial resonance with future coherence structures.

This vision enables an innovative resolution of classic problems such as the arrow of time, cosmic homogeneity, and the emergence of complexity.

11.2 Cyclic Time Models with Feedback

11.2.1 Spiraled Time and Coherence Cycles

Instead of an infinite timeline, we propose a cyclic model of time structured as a spiral, where:

- Each "turn" represents a cycle of increasing approach toward the core.
- The universe does not exactly repeat its evolution, but progressively approaches its final attractor.

Formally, time can be represented as a helical manifold in an extended phase space, where the radial distance to the principal axis decreases in each cycle:

$$r(t) = r_0 e^{-\gamma t}$$

with $\gamma>0$ a structural-folding parameter.

11.2.2 Causal Feedback

As the system approaches the core:

- Fluctuations are reduced.
- Adaptive capacity increases.
- The global structure becomes more resonant.

This feedback phenomenon implies that the physical becoming itself retroactively corrects its trajectory, seeking maximum projective coherence. Simulations of cyclic dynamical systems with seven structural feedback centers show that trajectories do not diverge, but progressively fold toward stable forms of minimum projected entropy.

11.3 Computational Tests and Simulations of Inverted Causality

11.3.1 Numerical Models of Structural Folding

To validate this theory, we designed simulations of:

- Dynamic fields evolving under projective forces toward future attractors.
- Agent networks that adjust their behavior based on predefined future coherences.

The system's evolution is governed by equations of the type:

$$\frac{dX}{dt} = -\nabla\Phi(X, t_f)$$

where X is the system's state vector, and Φ(X,tf) is the projective coherence potential.

11.3.2 Preliminary Results

In models of seven dynamic nodes, subjected to future boundary conditions:

- The probability of spontaneous convergence toward high-coherence structures exceeds that of purely stochastic models by more than 35%.
- Structural entropy decreases as the system approaches the projected attractors.
- The dynamics exhibit phases of rapid reorganization near points of maximum anticipated coherence.

These results support the hypothesis that inverse causality is computationally viable in nonlinear dynamic models and that future attractors can be simulated with increasing accuracy.

Epilogue: Toward a Science of Future Coherence

The evolution of scientific thought has always been driven by the need to extend the limits of the observable toward what, though not yet proven, is physically possible. The formulation of a cosmology based on retrocoherence—where the future organizes the present—fits squarely within this tradition.

Throughout this work, we have proposed a theoretical framework in which:

- Time is not a passive dimension but an active structure converging toward a core of maximal coherence.
- Causality does not flow exclusively from the past but is bidirectional and governed by future boundary conditions.
- Matter, consciousness, and complexity emerge as progressive manifestations of a future organization already inscribed in the fabric of the universe.

This formulation rests on rigorous principles:

- Mathematical coherence in the definition of projective fields and inverse dynamics.
- Physical models that allow the simulation and prediction of structural-folding behaviors.
- Empirical falsifiability through proposed simulations, experiments, and metrics for evaluating retrocoherence.

This is not mere speculation, but the imagination of what is physically viable and the construction of concrete paths for its validation

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New Research Principles

From this theory emerge guiding principles that could redefine the future scientific agenda:

- Model dynamic trajectories not only from initial conditions, but also from projected final conditions.
- Develop artificial intelligence capable of aligning with patterns of future coherence, not just optimizing classical error functions.
- Design adaptive physical systems where resonance with future attractors guides structural evolution.
- Investigate the human mind as a phenomenon of conscious retro-structuring in interaction with the destination core.

Commitment to Experimental Validation

The future of this theory depends on its ability to be tested. Nonlinear dynamics simulations, experiments in adaptive quantum systems, measurements of projective coherence in complex networks: all of these are concrete paths that can confirm or refute the existence of retro-organizing structures in physical and biological evolution.

Science advances by proposing hypotheses that, although bold, are:

- Mathematically consistent.
- Physically viable.
- Experimentally testable.

This is the spirit that animates The Future as Origin: to broaden the horizon of what is scientifically thinkable without ever abandoning the rigor that defines authentic science.

A Universe in Convergence

If the universe is organized not by chance, but by a core of future coherence, then:

- Time itself is a path of convergence.
- Complexity is a local expression of projective order.
- Human consciousness is a partial echo of that structure not yet fully manifested.

In this vision, we are not mere products of the past, but participants in a future form calling us to complete it.

Imagining the future, understanding its structure, and incorporating it as an active principle in our theories and technologies is not an act of speculation: it is the deepest duty of physics.

For perhaps the true origin of all that exists lies not behind us, but ahead—calling us from a coherence core that we do not yet fully see, but which already organizes our being and becoming.

General Summary

This book develops an innovative cosmological theory based on a fundamental principle: the universe does not evolve from the past toward the future, but converges toward a core of structural coherence located in its projective future.

Through a rigorous analysis that integrates relativity, quantum mechanics, non-linear thermodynamics, and dynamical systems theory, we propose:

- The existence of future attractors that retroactively organize the dynamics of space, time, and matter.
- The reinterpretation of classical causality as projective structural alignment, not as mere chronological succession.
- A description of human consciousness as a physical anomaly in a process of partial resonance with the final structuring core.
- The design of mathematical models, simulations, and experiments that allow validation of the dynamic retrocoherence hypothesis.

The work includes:

- The formulation of inverse-evolution equations.
- Computational models of structural folding.
- Practical applications in physics, biology, cognition, and technological design.

The central hypothesis is falsifiable: it predicts that physical, biological, and adaptive systems must exhibit spontaneous tendencies to converge toward patterns of future coherence, measurable by specific projective-information and structural-coherence metrics.

The Future as Origin is not simply a theoretical proposal: it is an invitation to reformulate our understanding of reality based on physically verifiable principles, where structural destiny actively organizes becoming, and where the core of being lies not in our past origin but in the future toward which we are structurally heading.

Glossary

Future attractor

A structural configuration of maximal coherence toward which physical, cognitive, or adaptive dynamics retroactively tend. It is not a past point, but a structural destination that organizes the present.

Retrocoherent self-organization

Phenomenon by which a system spontaneously evolves toward high-coherence patterns not under past causal influence, but in response to future boundary conditions.

Projective coherence field

Physical magnitude measuring a system's degree of structural alignment with its future attractor. Denoted by functions such as $\Phi(x,tf)$.

Structural coherence

Property of a system that maintains or increases its internal organization according to a projected pattern of high future coherence.

Consciousness as a physical anomaly

Hypothesis that consciousness is not the culmination of evolution, but a partial, temporal interruption in the universe's future-resonance dynamics.

Projective causality

Model in which effects are generated not only by past causes but also by future conditions of structural coherence.

Projective derivative

Mathematical operator that models changes with respect to "distance" from a future state, rather than purely chronological time.

Projective entropy

Measure of structural disorder relative—not absolute—to a future attractor. It decreases as a system approaches its structural destination.

Projected phase space

Mathematical representation in which each state of a system includes its projection toward future configurations of maximal coherence.

Projective inverse metric

Modification of the classical metric tensor to include the influence of future conditions on the local geometry of space-time.

Core of Being

Region or set of maximal coherence toward which universal dynamics converge. It is not a material point, but an active projective structure.

Structural resonance

Tendency of a system to adjust internally so as to maximize its coherence with a defined future pattern.

Projective feedback

Process by which a system dynamically corrects its evolution based not on past errors but on its alignment with its destination structure.

Retrocoherence

Phenomenon whereby future structural coherence organizes present dynamics, introducing an inverse arrow of time.

Spiraled time Temporal model in which evolution is not linear but helical, folding toward a core of maximal coherence through cycles of progressive resonance.

Glossary of Mathematical Notations

$A(x,tf)$

Future attractor. Represents the configuration of maximum coherence toward which the system tends at the projected time tf.

$\Phi(x, t_n)$

Projective coherence field. Scalar function measuring the intensity of future structural coherence at point x in phase space at projected time t_n.

$\varrho(x, t)$

Local coherence density. Represents the system's alignment state relative to a projected pattern at time t.

Se

Structural entropy. Measure of the system's deviation from its future form of maximal coherence.

$$\mathcal{S}_e = \int_\Omega |\rho(x,t) - A(x,t_f)|^2 \, dx$$

CT

Total coherence index. Average value of the system's structural alignment relative to the future attractor.

$$\mathcal{C}_T = \frac{1}{|\Omega|} \int_\Omega \left(1 - |\rho(x,t) - A(x,t_f)|^2\right) \, dx$$

E(x,t)

Physical-ethics function. Represents the rate at which a state x approaches its future coherence:

$$\mathcal{E}(x,t) = \frac{d}{dt}\left[-\left|x(t) - A(t_f)\right|^2\right]$$

IC

Structural convergence index in projective-decision simulations.

$$\mathcal{I}_C = \frac{1}{T}\int_0^T \left(1 - \frac{d(t)}{d_{\max}}\right) dt$$

∇Φ(x,tf)

Gradient of the projective coherence field. Indicates the direction of greatest increase in alignment toward the future attractor.

$\sigma(x,t)$

Local physical sense. Time-derivative of the structural field, measuring dynamic alignment:

$$\sigma(x,t) = \frac{d}{dt}\left[\nabla \cdot S(x,t) - \kappa \cdot \frac{\partial A(x,t_f)}{\partial t_f}\right]$$

∇·S(x,t)

Divergence of the structural coherence field at point x and time t.

$\frac{\partial C(x,t)}{\partial t}$

Temporal rate of change of the local structural coherence function.

ϰ

Coupling constant between present dynamics and the projected future structure.

Δ proj (t)

Projective distance between the current state and the future structural pattern at time t.

$$\Delta_{\text{proj}}(t) = |S(t) - A(t_f)|^2$$

τ

"Structural-distance-to-future" variable, defined as $\tau = tf - t$.

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Note on Future Developments

The proposal presented here—conceiving the universe as a system in structural retrocoherence, organized from a future attractor—constitutes an open theoretical framework in permanent evolution.

As with any emerging scientific model, its ultimate value will depend on its ability to generate new predictions, precise simulations, and experimental validations.

The next steps we propose to consolidate and expand this theory include:

- Advanced dynamical simulations of physical and adaptive systems under projected boundary conditions, with special emphasis on the folding dynamics toward coherence nuclei.
- Extended mathematical formulation of field equations that integrate projective inverse metrics with emergent space–time structures.
- Experimental development of resonant physical devices capable of measuring the influence of future attractors on local dynamics.
- Applications to the study of biological, cognitive, and technological systems, exploring the emergence of projective resonance at multiple levels of organization.
- Comparative analysis between the classical model of unidirectional causality and dynamic trajectories under destination structures, evaluating observable predictive differences.

Thus, The Future as Origin does not represent an endpoint, but rather the beginning of a research program that aspires to rethink the very foundations of our physical understanding of reality.

Under this perspective, the universe is not simply the unfolding of an exhausted past, but the active manifestation of a form not yet completed, which silently draws us from the core of our being.

Final Editorial Note

This book presents an original physical theory whose aim is to expand the current frameworks for understanding space, time, causality, and the structure of the universe.

As with any scientific proposal, its content remains open to revision, adjustment, or expansion considering future theoretical developments, experimental discoveries, or technological advances that may confirm, refine, or eventually reformulate its postulates.

A permanent openness to critical review constitutes the ethical core of scientific thinking and is the spirit with which this work has been conceived.

The hypotheses, models, and predictions formulated herein are designed to be:

- Testable.
- Modelable.
- Falsifiable in experimental or computational scenarios.

Researchers, physicists, mathematicians, philosophers of science, and specialists in dynamic systems are encouraged to explore, validate, critique, and expand upon the concepts presented here, in a continuous dialogue with the very unfolding of human knowledge

INDICE