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ABSTRACT

The Conventional View: Spacetime as a Pre-existing Arena. Our conventional understanding of the cosmos is deeply rooted in the notion of spacetime as a fundamental, pre-existing arena—a stage upon which the events of the universe unfold. Newtonian physics posited absolute space and absolute time, distinct and immutable frameworks providing a fixed background for motion and interaction. While Einstein’s theories of relativity revolutionized this view, transforming spacetime into a dynamic, four-dimensional geometric entity intrinsically linked with matter and energy—the “stage” itself capable of being warped and curved—it nevertheless often retains the conceptual status of an ontologically primary or co-fundamental aspect of reality. Matter-energy tells spacetime how to curve, and spacetime tells matter-energy how to move. Yet, persistent conceptual challenges remain: What is this spacetime fabric? Is it a subtle substance, a collection of fundamental geometric relations, an emergent property of deeper physics, or something else entirely? The question of spacetime’s ultimate nature continues to fuel debate at the frontiers of theoretical physics and philosophy.

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A New Way of Seeing

Chapter 12: The Emergence

of Spacetime

An Autaxic Reinterpretation of Relational Geometry and Temporal Process

Beyond

the Container—Spacetime as an Emergent Autaxic Construct

The Conventional View: Spacetime as a Pre-existing Arena. Our conventional understanding of the cosmos is deeply rooted in the notion of spacetime as a fundamental, pre-existing arena—a stage upon which the events of the universe unfold. Newtonian physics posited absolute space and absolute time, distinct and immutable frameworks providing a fixed background for motion and interaction. While Einstein’s theories of relativity revolutionized this view, transforming spacetime into a dynamic, four-dimensional geometric entity intrinsically linked with matter and energy—the “stage” itself capable of being warped and curved—it nevertheless often retains the conceptual status of an ontologically primary or co-fundamental aspect of reality. Matter-energy tells spacetime how to curve, and spacetime tells matter-energy how to move. Yet, persistent conceptual challenges remain: What is this spacetime fabric? Is it a subtle substance, a collection of fundamental geometric relations, an emergent property of deeper physics, or something else entirely? The question of spacetime’s ultimate nature continues to fuel debate at the frontiers of theoretical physics and philosophy.

The Autaxic Proposition: Spacetime as an Ordered Manifestation of Autaxic Relations. The autaxic framework, as systematically developed in this monograph, offers a radical departure from the conception of spacetime as a pre-existing container or fundamental fabric independent of process. This chapter advances and defends the core thesis that **spacetime is not a fundamental entity but an emergent relational structure**. It arises intrinsically and dynamically

from the ongoing interactions, systematic ordering, and collective dynamics of autaxic process-patterns themselves—the very patterns that, as argued in [Chapter 11](#), constitute what we conventionally term “particles” and “fields.” In this autaxic view, spacetime does not *contain* processes; rather, the **relational ordering** of autaxic processes **constitutes** what we perceive, measure, and mathematically describe as spacetime. The geometric and temporal properties of the universe are thus understood as emergent characteristics of the universe’s underlying autaxic architecture and its inherent generative dynamics. This perspective seeks to ground spacetime in the more fundamental, singular principle of autaxys: the intrinsic capacity of reality for self-generation and patterned order. The distinct value of this approach lies in its potential to *derive* spacetime’s existence and properties from this single, unified generative source, rather than positing spacetime as an additional, unexplained fundamental component of reality or merely describing its relations without a generative basis.

Building on Prior Autaxic Interpretations. This reinterpretation of spacetime builds directly and necessarily upon the foundations laid in previous chapters. [Chapter 11](#) established that “particles” are most coherently understood as persistent, dynamic autaxic process-patterns. If these fundamental constituents of matter and energy are themselves manifestations of autaxic activity, then their spatial and temporal relations—the very fabric that defines their co-existence, separation, and interaction—must also find their origin within the autaxic framework. Furthermore, [Chapter 8](#) detailed the “generative engine” and “meta-logic” of autaxys, outlining the inherent principles (such as **relational processing (Dynamic I)**, **symmetry breaking (Dynamic II)** as a source of differentiation, **coherence-seeking dynamics (Meta-Logic I & Dynamic IV)**, **feedback mechanisms (Dynamic III)** for pattern stabilization, and the **tendency towards interactive complexity (Meta-Logic V)**) that govern the emergence of all patterned order. It is from these fundamental generative principles that the specific characteristics of emergent spacetime—its perceived dimensionality, its metric structure, its apparent temporal flow—are derived. This chapter will explore precisely how these autaxic dynamics give rise to the spatio-temporal stage of our universe, demonstrating that spacetime is not merely a passive backdrop but an active, ongoing construction by autaxys itself.

The

Autaxic Genesis of Spatiality: From Relational Distinctions to Geometric Structure

The autaxic emergence of what we perceive as “space” begins not with an empty void awaiting population, but with the fundamental capacity of autaxys to generate distinctions and subsequently establish ordered relations among its emergent patterns.

Distinguishability and Separation as Primary Autaxic Concepts. Autaxys, through its inherent generative dynamics—particularly processes like **symmetry breaking (Dynamic II)** which allows for differentiation from a homogeneous state, and **feedback amplification (Dynamic III)** which stabilizes certain nascent patterns over others—creates **distinguishable process-patterns**. Each such pattern, by virtue of its unique configuration of autaxic activity and its specific relational signature, is distinct from other patterns and from the undifferentiated autaxic ground. This act of differentiation, of one pattern *not being* another, is the primordial ontological act from which all relational structure, including proto-spatiality, arises. The concept of “separation” or “externality” between these distinguishable patterns is a primary relational property emerging directly from these distinctions. If autaxic process-pattern A is demonstrably not autaxic process-pattern B, then there exists a relational “betweenness” that defines their mutual externality and allows for their co-existence as distinct entities. This “betweenness” is the most basic, proto-spatial concept within the autaxic framework. Space, in its embryonic form, begins as the system of ordered relations that articulates the co-existence, distinguishability, and potential for interaction among distinct autaxic process-patterns. It is not an emptiness, but a dynamically generated and maintained field of relational potential, structured by the very act of autaxic differentiation.

Dimensionality as an Emergent Property of Relational Complexity. The perceived dimensionality of phenomenal space (typically observed as three spatial dimensions plus one temporal dimension) is, from an autaxic perspective, an emergent property. It reflects the optimal complexity and constraints of the relational matrix required to consistently order the interactions of the types of autaxic process-patterns that constitute our observable universe. Dimensionality is not an arbitrary given, but a characteristic of the stable, large-scale relational architecture that autaxys’ “generative engine” produces and sustains. The specific **meta-logic of autaxys** (Chapter 8), including principles of **coherence (Meta-Logic I)** (favoring self-consistent relational networks), **conservation of distinguishability (Meta-Logic II)** (maintaining the integrity of emergent patterns), and the posited **tendency towards maximal interactive complexity within stable bounds (Meta-Logic V)**, plays a crucial role in favoring the emergence of a (3+1)-dimensional relational structure. For instance, the **relational processing (Dynamic I)** capacity of autaxys, when seeking stable and richly interactive configurations, finds that a three-dimensional spatial matrix offers an optimal topology. Such a structure supports complex network interactions—essential for the formation of stable composite patterns from more fundamental ones—while maintaining sufficient structural stability. Lower dimensionalities would overly constrain interaction potentials, severely limiting the emergence of complex structures. Conversely, higher, uncompactified spatial dimensions might lead to unstable interaction dynamics (e.g., rapidly diffusing influence, unstable “orbits” in force-analogue interactions), hindering the formation of persistent, complex patterns. Autaxys, through its inherent **feedback mechanisms (Dynamic III)** that select for stability and its drive towards coherent complexity, thus naturally settles upon a (3+1)-dimensional relational framework as an optimal solution for generating the kind of complex, evolving universe we inhabit. The dimensionality of space is therefore a profound consequence of autaxys’ intrinsic pattern-forming preferences and its stability-seeking generative dynamics.

Distance and Geometry: Metrics Arising from Autaxic Interaction Potentials. Within this emergent relational space, the concept of “distance” is fundamentally reinterpreted. It is not a measure across a pre-existing, empty void, but rather a quantification of the **relational “effort,” “separation,” or “interaction potential” between autaxic process-patterns**. This “effort” is a direct function of the underlying autaxic dynamics. For instance, it is conceptualized as the number of fundamental **relational processing (Dynamic I)** steps, or the sequence of mediating autaxic pattern-interactions, required for an influence to propagate between two patterns. Alternatively, it can be understood as a measure of the attenuation of coupling strength across the autaxic field-process that effectively separates them. The more “steps” or the weaker the direct coupling, the “further apart” they are in this relational sense. Consistent, stable metrics and geometric relations (whether locally Euclidean or globally non-Euclidean) emerge from the large-scale statistical ordering and consistent interaction rules of myriad autaxic process-patterns. This emergence is analogous to how macroscopic properties of a fluid, like pressure or viscosity, arise from the collective behavior of its constituent molecules. Similarly, the geometric properties of space emerge from the collective relational dynamics of its constituent autaxic patterns, stabilized through autaxys’ **coherence-seeking tendencies (Meta-Logic I & Dynamic IV)** and **feedback loops (Dynamic III)**. The “fabric” of space is, in this autaxic view, the collective, statistically stable expression of these underlying relational potentials and constraints. It is a dynamic and emergent geometry, continuously woven and re-woven by the interactions of autaxys’ own creations. The autaxic framework thus provides a mechanism for geometry itself to be *generated* from more fundamental process principles, rather than being assumed as a primitive or imposed externally.

The

Autaxic Genesis of Temporality: From Processual Change to Directed Becoming

Temporality, like spatiality, is understood within the autaxic framework not as an independent, pre-existing dimension through which events flow, but as an intrinsic aspect of autaxys’ fundamentally dynamic and generative nature.

Time as an Intrinsic Aspect of Autaxic Process. Autaxys is process; its very definition as a self-generating, self-arranging system (Chapter 7) entails continuous transformation and relational unfolding. Therefore, change, sequence, and becoming are not events occurring *within* an external, flowing time; they are the intrinsic modes of autaxys' being. The perceived “flow” of time is, from this perspective, the direct experience or measure of the continuous unfolding of autaxic generative processes and the ceaseless transformations of its emergent patterns. Time is not a river in which things happen; time is the happening, the fundamental processuality of autaxys itself. Every operation of autaxys' “generative engine,” every instance of **relational processing (Dynamic I)** or **symmetry breaking (Dynamic II)**, is an increment of this fundamental becoming.

Duration and Interval: Measures of Autaxic Transformation. “Duration” or a “time interval” is reinterpreted within autaxys as a measure of the **extent or number of fundamental autaxic operations or state transformations** that occur between two distinguishable configurations of a process-pattern or a system of patterns. If autaxys operates through effectively discrete generative steps or relational updates (a notion supported by the emergence of quantization from stable autaxic modes, as discussed in Chapter 11), then duration is a count or integral of these fundamental process-steps. Physical clocks are themselves stable, periodic autaxic systems (e.g., an oscillating crystal, an atom undergoing regular state transitions due to its stable autaxic configuration, maintained by autaxic **feedback (Dynamic III)** and **resonance (Dynamic IV)**). They provide a means to quantify temporal intervals by correlating their own regular, countable transformations with the transformations occurring in other systems. The “tick” of a clock is a unit of autaxic process. The measurement of time is thus always a comparison of processes—the process being measured against the reference process of the clock—both ultimately grounded in the rhythm of autaxic operations.

The “Arrow” of Time: An Emergent Consequence of Irreversible Autaxic Dynamics. The perceived unidirectionality of time—the “arrow of time” that distinguishes past from future—is a profound feature of our experience. Within the autaxic framework, this arrow is an emergent consequence of the fundamentally generative and often irreversible nature of autaxic dynamics, rather than a property of a fundamental time dimension itself. Several aspects of autaxys contribute to this directedness. Firstly, the **generative and complexity-increasing nature of autaxys**, as guided by its meta-logical principles (such as the **tendency towards maximal interactive complexity within stable bounds (Meta-Logic V)**, a core aspect of its “generative engine” detailed in Chapter 8), implies that as autaxys unfolds, it tends to create increasingly complex and differentiated patterns. Once highly specific and complex configurations emerge through a sequence of autaxic operations, the probability of their exact spontaneous reversal to simpler, antecedent states through undirected autaxic fluctuations becomes exceedingly low. This is not a statement of absolute impossibility, but one of overwhelming statistical improbability, analogous to the thermodynamic arrow of time. Autaxic processes, in generating novelty and complexity through mechanisms like **symmetry breaking (Dynamic II)** and **feedback amplification of selected patterns (Dynamic III)**, create a de facto irreversibility in the sequence of emergent states. Secondly, the **relational definition of “past” and “future”** within an interacting system of autaxic patterns contributes to the arrow. For any given process-pattern or event, its “past” is constituted by the set of other patterns or events that could have causally influenced (through the propagation of autaxic relations, a form of **relational processing (Dynamic I)**) its current state. Its “future” is constituted by the set of patterns or events that its current state can, in turn, influence. This relational, influence-based ordering, inherent in the way autaxys' “generative engine” processes relations and produces effects, inherently creates a directedness from conditions of prior influence to conditions of subsequent potential influence. This emergent, processual arrow of time is distinct from, and ontologically deeper than, notions of time as a fundamental geometric dimension along which events are merely arrayed. It is rooted in the creative, transformative, and relationally ordered dynamics of autaxys itself.

Spacetime

Unified: The Relational Matrix of Autaxic Events

The autaxic perspectives on spatiality (as emergent relational order) and temporality (as intrinsic processual unfolding) are not independent. They are intrinsically unified, arising from the same underlying relational dynamics of autaxys. This unification is most clearly apprehended by focusing on “events” as the fundamental constituents of the emergent spacetime manifold.

Events as Fundamental: Interactions and Transformations of Autaxic Patterns. The autaxic framework elevates “**autaxic events**” to a fundamental ontological status, shifting focus from “particles existing in spacetime” to these events as the primary constituents of reality’s fabric. An event is defined as a specific, localized interaction, creation, annihilation, or transformation of one or more autaxic process-patterns. Each such event is characterized by a discernible change in the relational state of the involved patterns and, by extension, a change in the local configuration of autaxic activity. These events are inherently spatio-temporal. Their “spatial” aspect is defined by their relational position within the network of co-existing patterns at the “moment” (a specific stage of autaxic unfolding) of their occurrence. Their “temporal” aspect is defined by their position within the sequence of transformations leading to and flowing from them. The universe, from this perspective, is a vast, evolving network of such autaxic events, each defined by its relations to others. Spacetime is the structured totality of these event-relations, dynamically generated and ordered by autaxys.

The Spacetime Interval: An Invariant Measure of Autaxic Relationality. The concept of the spacetime interval in Einstein’s Special Relativity—an invariant quantity combining spatial distance and temporal duration that all inertial observers agree upon—finds a natural and profound reinterpretation within the autaxic framework. The spacetime interval is understood as a fundamental measure of the **relational “connectedness” or “causal influence potential” between two autaxic events**. It quantifies the degree of autaxic “effort” or the number of fundamental autaxic process-steps (a combination of spatial-relational steps and temporal-processual steps, reflecting the **relational processing (Dynamic I)** of autaxys) required to connect one event to another through the network of autaxic relations. Its invariance across different emergent frames of reference (which themselves correspond to different large-scale motional states of autaxic pattern-systems) reflects a deep consistency in the underlying relational structure and processing rules of autaxys. The Lorentz transformations, which relate measurements between different inertial frames, are then seen as descriptions of how the phenomenal measures of spatial separation and temporal duration must systematically vary to preserve this fundamental autaxic relational invariant. This provides an ontological grounding for the mathematical structure of Minkowski spacetime, deriving it from the processing rules of autaxys’ “generative engine” rather than positing it axiomatically.

The Dynamic “Fabric” of Spacetime: Autaxys Responding to Its Own Patterning. The Einsteinian notion of spacetime as a dynamic “fabric” that can be warped or curved is fully embraced and grounded by autaxys. This dynamism arises because the relational matrix constituting spacetime is not static but is continuously being shaped by the very autaxic process-patterns that exist and interact “within” it. The presence of highly concentrated or energetic autaxic process-patterns (those corresponding to what conventional physics terms mass-energy) inherently influences the relational structure of the surrounding autaxic “medium” or field-system. This influence is a direct consequence of autaxys’ **feedback dynamics (Dynamic III)**, where emergent patterns modify the conditions for subsequent pattern formation and interaction. These concentrations of patterned autaxic activity alter the pathways of potential interaction and the relational “density” for other process-patterns in their vicinity. This modification of the relational matrix by its own constituents is what manifests phenomenally as the “curvature” of spacetime. Spacetime is not merely a passive stage; it is an active participant, constantly being reconfigured by the autaxic drama unfolding upon it—a drama of which it is itself an emergent expression. Autaxys generates patterns, and these patterns, in turn, structure the very relational field of autaxys in which they exist, creating a self-consistent, evolving architecture.

Implications

for Gravity: Towards an Autaxic Understanding

This autaxic view of emergent and dynamic spacetime leads directly to a novel and potentially unifying understanding of gravity, one that seeks to resolve the conceptual difficulties faced by conventional approaches by grounding gravitational phenomena in the fundamental generative activity of autaxys.

Gravity not as a Force, but as an Emergent Manifestation of Autaxic Spacetime Dynamics. Consistent with the geometric interpretation of General Relativity, autaxys understands gravity not as a fundamental force mediated by exchange particles (such as a hypothetical, and from an autaxic viewpoint, problematic graviton) in a fixed background spacetime. Instead, gravity is an **emergent manifestation of the dynamics of autaxic spacetime itself**. The “curvature” of spacetime, as described above, is the modification of the relational matrix of autaxic events by dense concentrations of autaxic process-patterns (mass-energy). The “force” of gravity is then understood as the tendency of other autaxic process-patterns to follow paths of extremal relational “effort” or “influence potential” (geodesics) within this dynamically structured relational matrix. Patterns move in certain ways not because they are “pulled” by an external force, but because the very relational geometry of their existence, as defined by the surrounding autaxic configurations, guides their trajectories. Gravity is thus an expression of how autaxys structures its own relational space in response to its own emergent patterns. This provides a direct ontological grounding for *why* mass-energy influences spacetime geometry: mass-energy is a concentration of specific autaxic patterning, and spacetime is the relational order of that patterning. The interaction is intrinsic, obviating the need for a separate mediating particle for gravity at this fundamental level of description. The distinct contribution of autaxys here is its ability to derive these gravitational effects from the same generative principles that form particles and spacetime, offering a more unified and parsimonious ontology than frameworks that must posit gravity or spacetime geometry as separate fundamental entities.

Re-examining Gravitational Puzzles through an Autaxic Lens. The autaxic framework provides a new lens through which to re-examine phenomena currently leading to the inference of entities like dark matter and dark energy, and the challenge of quantizing gravity. Instead of necessarily positing new substances or ad-hoc fields, autaxys prompts an inquiry into whether these “puzzles” are manifestations of large-scale autaxic dynamics or consequences of an incomplete understanding of how autaxys generates spacetime and matter. The observed galactic rotation curves, for instance, which conventionally lead to the inference of **dark matter**, are re-evaluated. The autaxic perspective asserts that these dynamics arise not from unseen particles, but from the large-scale relational structure of the autaxic field-system itself within and around galaxies, or from modifications to inertial properties of matter that emerge from autaxic principles at galactic scales. The “missing mass” problem is thus reframed as a mischaracterization of the universe’s fundamental relational architecture or its dynamic expression at large scales, a mischaracterization that autaxys aims to correct by providing a more complete account of the universe’s generative substrate. Similarly, the cosmic acceleration attributed to **dark energy** is addressed by autaxys through an examination of its intrinsic generative properties. This acceleration is interpreted as a manifestation of an inherent expansionary dynamic within autaxys’ “generative engine”—perhaps linked to its **tendency towards increasing interactive complexity (Meta-Logic V)** and the continuous generation of new relational “space” as it unfolds. It could also be an effect related to the evolving relational density or “pressure” of the universe’s overall autaxic architecture. Autaxys thus offers a pathway to explain the observed acceleration from first principles, as a feature of the universe’s fundamental operating system, rather than requiring the postulation of a mysterious, independent energy field whose origin and nature remain unexplained. Furthermore, the challenge of **quantizing gravity** is fundamentally reframed. The persistent difficulties in unifying General Relativity with quantum mechanics, autaxys argues, stem from attempting to quantize a classical geometric field (spacetime) that is itself treated as fundamental. Autaxys proposes a more fruitful path: understanding how a fundamentally discrete or granular structure at the level of autaxic events and their relations gives rise to the *appearance* of a smooth spacetime manifold at larger scales. Since quantum effects are intrinsic to all autaxic process-patterns (as argued in [Chapter 11](#)), they are already incorporated into this emergent spacetime structure from the ground up. The “quantization of gravity” then becomes a question of understanding the quantum nature of the

underlying autaxic relational processes that *constitute* spacetime, rather than imposing quantum rules on a pre-existing classical geometry. This approach promises a natural unification by deriving both quantum phenomena and gravitational phenomena from a common, deeper autaxic foundation. These are not presented as fully finalized solutions, but as robust avenues for autological research, illustrating how a fundamental reconceptualization of spacetime, rooted in the generative principles of autaxys, can offer more parsimonious and coherent explanations for observed cosmic phenomena. This demonstrates the unique value of autaxys by showing its potential to resolve deep-seated anomalies without proliferating unexplained entities.

Advancing

the “New Way of Seeing”: Spacetime as Living Architecture

Summarizing the Autaxic Reinterpretation of Spacetime. In summary, the autaxic framework reinterprets spacetime not as a passive, pre-existing container for reality, but as an **active, emergent, and fundamentally relational construct**. It is intrinsically linked to, and co-arises with, the existence and interaction of the autaxic process-patterns that constitute matter and energy. Spatiality emerges from the ordered relations of distinguishability and interaction potential among these patterns, shaped by autaxys’ generative dynamics, particularly its capacity for **symmetry breaking (Dynamic II), relational processing (Dynamic I), and coherence-seeking (Meta-Logic I & Dynamic IV)**. Temporality emerges from the intrinsic dynamism and sequential unfolding of autaxic processes themselves, with its arrow derived from the system’s generative irreversibility. Unified spacetime is the dynamic, evolving relational matrix of all autaxic events. It is, in essence, the “ordered grammar” of autaxic relations, the very architecture of patterned existence, constantly being shaped by and shaping the autaxic processes it manifests—a form of living, self-constructing architecture.

The Coherence with Previous Chapters and the Path Forward. This autaxic view of spacetime reinforces the central arguments of this monograph. It powerfully underscores the critique of naive realism developed in Part I, demonstrating that even the most seemingly fundamental aspects of our perceived reality, like space and time, are not directly apprehended “as they are” but are deeply structured by underlying generative principles. It builds directly upon the autaxic reinterpretation of “particles” as process-patterns ([Chapter 11](#)), providing the relational context in which these patterns exist, interact, and evolve. Furthermore, by grounding spacetime in the “generative engine” of autaxys ([Chapter 8](#)), this chapter strengthens the overall coherence and explanatory ambition of the autaxic framework. It shows how a singular ontological principle—autaxys—provides a unified foundation for understanding not only the “actors” on the cosmic stage (particles) but also the “stage” itself (spacetime), revealing them both as emergent manifestations of its intrinsic creativity.

Having established an autaxic understanding of particles and now spacetime, the subsequent chapters in Part III will continue to explore the embodiment of autaxys in physical reality. This will include a deeper examination of the nature of mass and energy as manifestations of autaxic process, the principles underlying the formation of complex structures from atoms to galaxies, and the initial articulation of the “autaxic table of patterns”—a systematic classification of emergent patterns based on their generative autaxic origins. Each step aims to further solidify the “new way of seeing” offered by autology, revealing a universe that is not merely a collection of objects and forces, but a profoundly interconnected, self-generating, and continuously unfolding tapestry of autaxic process and pattern.

13 Mass, Energy, and Equivalence