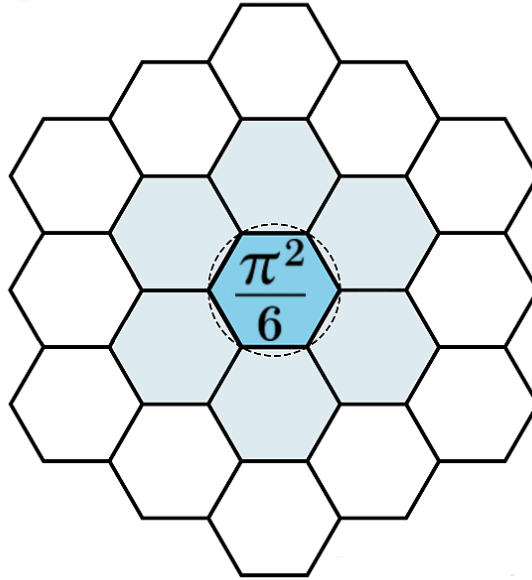


A Structural Replacement for Dark Matter and Dark Energy

A Geometry-First Cosmology in Pattern Field Theory

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Abstract

This paper presents a structural cosmology based on Pattern Field Theory (PFT) in which the concepts known as dark matter and dark energy are shown to be ontological artifacts. We demonstrate that both phenomena arise from imposing a metric-first and substance-based ontology on a universe whose actual generative structure is a two-dimensional pattern field bound through a one-dimensional depth-commitment process. Using the Allen Orbital Lattice (AOL) and the Phase Alignment Lock (PAL) constraint, we show that galactic-scale excess gravitational effects follow from lattice tension and phase coherence requirements, while cosmological expansion follows from irreversible structural coupling toward Equilibrion. No additional substances, fluids, or hidden sectors are required. All observed effects follow from structural commitments of the pattern field itself. The paper provides a falsifiable replacement for the dark sector within a fully mechanical and geometry-first ontology.

The Dark Sector as an Ontological Symptom

Modern cosmology explains galactic rotation anomalies and large-scale expansion by introducing two unobserved entities: dark matter and dark energy. These entities are not derived from first principles. They are introduced as corrective terms required to preserve a metric-first and force-based ontology.

In Pattern Field Theory, such corrective entities are treated as symptoms of an incorrect foundational model. When the ontology is corrected to a structural theory of form, the need for these entities disappears.

Proposition 1 (Placeholder Principle). *If a physical model requires unobservable substances to preserve its equations, then the ontology of the model is incomplete.*

Dark matter and dark energy are such placeholders.

Foundational Structure of Pattern Field Theory

Pattern Field Theory begins from a Null foundation and constructs reality from admissible two-dimensional pattern relations committed through one-dimensional depth binding.

Definition 1 (Pattern Field). *A pattern field is a two-dimensional relational structure defined by adjacency, routing, and combinatorial constraints without intrinsic metric or persistence.*

Definition 2 (Depth-Binding). *Depth-binding is the operation that commits a two-dimensional pattern route into a persistent identity by adding a one-dimensional binding dimension.*

Definition 3 (Allen Orbital Lattice). *The Allen Orbital Lattice (AOL) is the discrete structural substrate that enforces admissible pattern geometry and coherence constraints at all scales.*

Definition 4 (Phase Alignment Lock). *The Phase Alignment Lock (PAL) is the coherence constraint that enforces phase compatibility and structural continuity across bound pattern domains.*

Structural Origin of Galactic Dynamics

Observed galactic rotation curves exhibit excess binding relative to predictions derived from visible mass distributions.

In PFT, this effect arises from structural requirements:

Proposition 2 (Lattice Tension). *Maintaining large-scale coherent identity-routes in the AOL requires additional structural commitment proportional to domain size and phase alignment complexity.*

Proposition 3 (Structural Gravity). *What is interpreted as excess gravitational attraction is the energetic and geometric cost of maintaining PAL coherence across extended lattice domains.*

No additional mass component is required. The effect follows from the cost of depth-commitment and phase alignment.

Structural Origin of Cosmological Expansion

The observed expansion of the universe is commonly attributed to a uniform energy density with negative pressure.

In PFT, expansion follows from irreversible structural coupling.

Definition 5 (Equilibrion). *Equilibrion is the asymptotic structural relaxation state of the pattern field under irreversible binding and radiation flow.*

Proposition 4 (Null-Up Process). *The universe expands because the pattern field irreversibly couples bound structures into deeper commitments, producing a net outward geometric relaxation.*

Expansion is therefore a geometric byproduct of structural commitment, not a force-driven acceleration.

Viability Criterion

Definition 6 (Structural Viability). *A physical entity or effect is viable if and only if it can be derived from two-dimensional pattern relations bound through one-dimensional depth commitment.*

Proposition 5 (Elimination of the Dark Sector). *Neither dark matter nor dark energy satisfy the structural viability criterion. Both are therefore non-entities in a correct ontology.*

All observed phenomena attributed to them are accounted for by lattice tension, phase alignment, and irreversible coupling.

Consequences for Cosmology

This replacement implies:

- No hidden mass components
- No vacuum energy fluids
- No metric-first ontology
- No force-first explanations

Cosmology becomes a structural accounting of pattern commitments and coherence constraints.

Conclusion

Dark matter and dark energy are not features of the universe. They are artifacts of an incorrect ontology. When reality is modeled as a pattern field committed through depth-binding under the constraints of the Allen Orbital Lattice and Phase Alignment Lock, both galactic dynamics and cosmological expansion follow mechanically. No dark sector is required.

Glossary

- **Pattern Field** - Two-dimensional relational structure of admissible pattern space
- **Depth-Binding** - Operation that creates persistence
- **Allen Orbital Lattice (AOL)** - Structural substrate enforcing coherence
- **Phase Alignment Lock (PAL)** - Coherence constraint on bound patterns
- **Equibrion** - Asymptotic structural relaxation state
- **Structural Viability** - Criterion for physical existence

References

This paper is falsifiable by comparison with galactic rotation curves, gravitational lensing maps, large-scale structure surveys, and cosmological expansion measurements. Empirical confrontation will be provided in subsequent audit papers.

Document Timestamp and Provenance

This document is part of Pattern Field Theory (PFT) and the Allen Orbital Lattice (AOL). It defines a structural replacement for dark matter and dark energy based on depth-binding, lattice tension, and phase alignment. Pattern Field Theory™ (PFT™) and related marks are claimed trademarks. This work is licensed under the Pattern Field Theory™ Licensing framework (PFTL™). Any research, derivative work, or commercial use requires an explicit license from the author.