

The Attralucian Essays:
Exploring the Finite



First Edition

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From External-Basin Physics to Finite
Interaction Geometry

Kevin R. Haylett

On Finite Interactions

From External-Basin Physics to Finite Interaction Geometry

Introduction: The Central Distinction

Geofinitism and Finite Symbolic Mechanics begin from a simple but disruptive commitment: what cannot be finitely measured, represented, or operationally related cannot be admitted as foundational. This does not mean that existing mathematical or physical theories are useless. Quite the opposite. General relativity, quantum mechanics, Maxwellian electrodynamics, complex analysis, and classical geometry are among the most successful symbolic compressions ever produced. They preserve measurable relations with astonishing power.

However, within the basin of Geofinitism, *successful compression is not the same as foundational admissibility*.

A theory may work and yet still carry commitments that cannot be accepted as primary. Smooth continua, zero-

dimensional points, exact real values, infinitesimals, infinite fields, infinite-dimensional Hilbert spaces, ideal manifolds, and unmeasured imaginary axes may all function effectively within classical mathematical physics, but they are not directly measurable entities. They are symbolic extensions. They are useful fictions. They may guide calculation, but they cannot be treated as the ground of reality within a finite philosophy of measurement.

This distinction is central.

Geofinitism does not reject classical physics because it fails. It reframes classical physics because it succeeds too well while concealing the symbolic machinery that enables its success. The task is therefore not to discard general relativity, quantum mechanics, or electrodynamics, but to recover the finite measurable structures they preserve.

The Central Formulation

The central formulation may be stated as follows:

Within Geofinitism, gravity and electrodynamics may be treated as limiting projections of a single finite interaction-density geometry *within the symbolic realm*. Current GR, QM, and Maxwellian formulations are retained as successful external-basin compressions, but their continuum and infinite commitments are not

admitted as foundations.

This statement captures the bridge between the classical basin and the Geofinite basin.

Classical physics begins with abstract mathematical objects and then interprets the world through them. Geofinitism reverses the direction. It begins with finite measurement, finite representation, symbolic generation, uncertainty, provenance, and the Generonic boundary. Only after these commitments are made may mathematics arise.

In this sense, mathematics is not the master language from which explanation descends. Mathematics is the crystallised compression of prior symbolic-measurement relations. Narrative explanation is not decorative. It is the generative flow from which formalism emerges.

A Note on the Status of This Essay

This essay is a programme statement, not a technical derivation. It outlines a research direction for reframing gravity and electrodynamics within Geofinitism and Finite Symbolic Mechanics (FSM). The technical development – including explicit finite field equations, nodal update rules, and reconstruction theorems – will be presented in separate documents building on the earlier Finite Mechanics theses. The practical empirical results (Mercury’s perihelion, galaxy rotation curves without dark

matter, stabilised electron orbits) are summarised in Section below, with full details to follow in later technical reports.

The Classical Basin and Its Hidden Commitments

General relativity and quantum mechanics are often presented as the two great pillars of modern physics. General relativity describes gravity as geometry. Quantum mechanics describes matter, radiation, and interaction through operators, probabilities, amplitudes, and complex-valued state spaces. Maxwellian electrodynamics describes electric and magnetic phenomena using coupled field equations.

Each theory has extraordinary measurable success. Yet each is founded upon mathematical structures that exceed finite measurement.

General relativity assumes a smooth spacetime manifold. Quantum mechanics assumes exact complex amplitudes and abstract Hilbert-space structures. Maxwellian electrodynamics assumes fields that vary continuously through space and time. Classical mathematics assumes exact real numbers, exact equality, zero-dimensional points, and infinitely divisible continua.

Inside their own basin, these assumptions are produc-

tive. They generate equations, predictions, approximations, instruments, technologies, and experimental programmes.

Inside Geofinitism, however, they are not admissible as foundations.

This is not a rhetorical objection. It is a measurement objection.

A zero-dimensional point cannot be measured. An infinitely precise real value cannot be obtained. A smooth continuum cannot be directly sampled. An infinitesimal is not an operational entity. An infinite-dimensional Hilbert space is not a measured object. The imaginary axis is not directly read from an instrument. These may be powerful symbolic constructions, but they are not the same as measured reality. Geofinitism therefore asks a different question:

What measurable structure do these theories preserve?

That question changes the entire project. Instead of asking whether general relativity or quantum mechanics is “true” in a metaphysical sense, Geofinitism asks which finite relational invariants they successfully compress. The classical theories become high-level symbolic machines. Their success becomes evidence that they are preserving something of relational value, but not necessarily that their foundational commitments to Platonic forms and infinity can ever be measurable.

Measurement Before Mathematics

The Geofinite commitment is that measurement comes before mathematical idealisation.

In the Geofinite thesis on geometry, the foundational postulate is stated directly: every representation must have a measurable volume. This single move changes the status of geometry, number, symbol, and equation.

A point is no longer a primitive. A line is no longer a primitive. A plane is no longer a primitive. Each becomes an idealised compression of finite representational events. A real mark has extent. A symbol has substrate. A measurement has uncertainty. A written or computed number has physical form. A mathematical expression occupies space, time, memory, energy, and provenance.

From this perspective, classical geometry is not false, but idealised. Its exact forms are limiting symbolic abstractions. They are not the first layer of reality.

This is why the Geofinite triangle becomes so important. In classical geometry, the triangle is a two-dimensional ideal. In Geofinitism, a measurable triangle cannot be purely two-dimensional. Its vertices occupy finite regions. Its edges have thickness. Its surface has depth. It becomes a finite volumetric structure, not an ideal planar figure.

Once that is admitted, perfect closure disappears. A fi-

nite triangle does not close with Platonic exactness. It carries a residual. Curvature is no longer only a cosmic or large-scale property. It appears locally as the non-closure of finite geometric cells. The Geofinite thesis states this as a principle: *curvature is the local non-closure of finite geometric cells and is the natural consequence of finity.*

This is a profound move because it allows curvature to be grounded in finite measurement rather than in an ideal manifold.

In general relativity, curvature belongs to smooth space-time. In Geofinitism, curvature belongs first to finite mis-closure.

That difference matters.

The Generonic Boundary and the Two Realms

The Generonic boundary is the boundary at which symbol generation, measurement, and finite distinguishability meet. It marks the point beyond which explanation can no longer claim direct measurement and must become model, inference, compression, or extrapolation.

To understand the Geofinite position, we must distinguish two realms:

- **The Geofinite Continuum:** The non-symbolic

condition of possibility for measurement. It is not a thing, not a field, not a geometry. It is an *inference* – the necessary postulate that there is something that allows finite measurements to occur. It cannot be directly represented or measured.

- **The Symbolic Realm:** The domain of finite symbols (Nexils), relations, projections, trajectories, and reconstructions. This is where mathematics, language, models, and geometries live. Every geometric object in this essay – nodes, adjacency, interaction density, curvature, mis-closure – exists *within the symbolic realm*. It is an endogenous construction, not a description of the Geofinite Continuum.

The generonic process operates at the interface between these two realms. Through finite interaction with the Geofinite Continuum, it produces distinctions that become symbols. Those symbols then enter the symbolic realm, where they may be related, projected, compressed, and modelled.

Thus, when we speak of “interaction-density geometry” in this essay, we are speaking of an *endogenous symbolic geometry* – a model constructed from measured symbols, not a claim about a hidden substrate. The geometry is in the symbols, not behind them.

Empirical Grounding: Early Finite Mechanics Results

The Geofinite reframing of gravity is not invented. It descends directly from an earlier computational programme in Finite Mechanics (initiated in 2024). There, orbital and galactic dynamics were modelled by introducing an explicit acceleration-dependent implicit-mass residual,

$$m_{\text{implicit}} = k \cdot a,$$

(or $k' \cdot a$ in atomic cases), while preserving only finite, measurable quantities.

This nodal correction reproduced:

- **Mercury's excess perihelion precession** (43.1/cen-tury) with a single empirically determined $k = 1.67 \times 10^{21}$.
- **Stabilised electron orbits** in fourth-order Runge-Kutta simulations, without wave-function collapse.
- **SPARC galaxy rotation curves** shell-by-shell,

$$M_{\text{UM,shell}}(r) = \frac{(v_{\text{obs}}^2 - v_{\text{Newt,shell}}^2) r}{G},$$

with $R^2 > 0.98$ across dozens of galaxies – no dark-matter halo required.

Those models operated in a correspondence mode, map-

ping nodal residuals onto classical equations. In the present Geofinite framework, the implicit-mass term is reinterpreted as the local signature of finite relational non-closure within an endogenous interaction-density geometry. The empirical successes become evidence that the nodal substrate already preserves the measurable invariants of gravity, while the Generonic boundary now disciplines the residual as intrinsic uncertainty rather than tunable error.

What began as practical finite-axiom computation has matured into the local symbolic representation of Finite Symbolic Mechanics. The full technical development – including explicit finite field equations and reconstruction theorems – will be presented in later documents building on these earlier theses.

Defining Endogenous Interaction-Density Geometry

Because the phrase “interaction-density geometry” risks misunderstanding, we define it carefully here.

By *interaction-density geometry* we mean a finite, endogenous symbolic structure within the symbolic realm, constructed from measured Nexils, that models the relations between finite interaction events. It is not a description of the Geofinite Continuum. It is a *model* –

a useful compression – that organises measured distinctions into a geometric language (nodes, adjacency, density, mis-closure, phase).

Key properties of this endogenous geometry:

- It is **finite**: only a finite number of nodes, finite adjacency, finite interaction densities.
- It is **measured**: all quantities derive from finite measurement events (Nexils), not from Platonic ideals.
- It is **endogenous**: it exists within the symbolic realm, constructed through projection policies and reconstruction operators.
- It is **provenance-bearing**: every node, edge, and density carries the trace of its measurement origin.
- It is **uncertain**: all quantities carry irreducible uncertainty bounded by the Alphonic Limit.

Within this endogenous geometry, we may then define:

- **Gravity** as accumulated finite mis-closure – the measurable deviation from perfect relational correspondence.
- **Electrodynamics** as finite phase-coupled relational update – the measurable structure of delay, rotation, and oscillation.

Both are *endogenous symbolic constructions*. Neither

refers to a hidden substrate beyond measurement.

Gravity as Finite Mis-Closure

In the classical basin, general relativity says that gravity is not a force in the Newtonian sense but a manifestation of spacetime curvature. Matter and energy shape the geometry of spacetime, and bodies follow geodesics within that geometry.

This is a powerful compression. But its usual formulation rests on a smooth differentiable manifold and infinitesimal curvature. Inside Geofinitism, those cannot be foundational. So the question becomes:

What measurable structure is GR preserving?

The answer is: relational deviation, closure failure, path dependence, and interaction-dependent geometry. In Geofinite terms, gravity may be reframed as accumulated finite mis-closure within a relational nodal structure. A gravitational effect is not first a property of a smooth manifold. It is first a measurable deviation in relational correspondence between finite identities. Within the endogenous interaction-density geometry, we may write a finite field equation that expresses this direction:

geometric mis-closure \sim measurable interaction density.

The classical Einstein field equations,

$$G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu},$$

become a limiting projection of this finite mis-closure relation, valid only when the continuum approximation holds and when measurement uncertainty can be neglected. The classical manifold becomes a limiting compression. The finite nodal structure becomes the admissible base. Gravity, then, is not rejected. It is re-grounded as an endogenous symbolic geometry of mis-closure.

Electrodynamics as Finite Phase-Coupled Interaction

Electrodynamics is usually described in terms of electric and magnetic fields, charges, currents, potentials, waves, and propagation. These are classically formulated as smooth fields over continuous spacetime. Again, within Geofinitism, these concepts assume Platonic correspondence that by definition are outside the foundational commitments in geofinitism, to a measured world of symbols that does not commit to correspondence with platonic ideals.

The measurable content of electrodynamics includes phase, oscillation, propagation delay, charge asymmetry, rotation, resonance, and interaction between finite systems.

These are all compatible with a finite relational account.

In a Geofinite reframing:

- Electric behaviour may be interpreted as local directed asymmetry in relational correspondence.
- Magnetic behaviour may be interpreted as rotational or phase-coupled structure arising from the update of those correspondences.
- Radiation becomes finite propagation through the relational lattice.
- Charge becomes a stable asymmetry in finite interaction identity.
- Electromagnetic waves become phase-coherent update patterns across the nodal structure.

This is where the complex-number reframing becomes essential. Classical electrodynamics makes heavy use of complex numbers, phasors, wavefunctions, oscillations, Fourier methods, and phase relationships. Once phase is understood as relational delay (rather than imaginary ontology), electrodynamics can be reinterpreted as a finite phase-reconstruction regime.

In this sense, electrodynamics is not fundamentally a theory of invisible smooth fields. It is a theory that preserves measurable phase-coupled relational update structures.

That is the bridge to gravity.

Gravity is finite mis-closure.

Electrodynamics is finite phase-coupled relational update.

Both are expressions of endogenous interaction-density geometry.

Toward a Unified Endogenous Hierarchy

The unification suggested here is not a conventional unification of GR and QM. It is not “quantise gravity” or “geometrise quantum mechanics” in the inherited language of either basin. It is perhaps deeper and relational. It says that gravity and electrodynamics may be limiting projections of a single finite endogenous structure, where nodes, adjacency, interaction density, phase, delay, curvature, and symbolic measurement all arise together within the symbolic realm. A possible hierarchy within the endogenous symbolic realm is:

- Finite distinction gives rise to symbol (Nexil).
- Symbol requires volume, substrate, and provenance.
- Finite symbols form relational identities.
- Relational identities form nodal structures (endogenous geometry).
- Nodal structures update through finite interaction.

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- Finite interaction produces phase, delay, and mis-closure.
- Phase-coupled update appears as electrodynamics (limiting projection).
- Accumulated geometric mis-closure appears as gravity (limiting projection).
- Unresolved interaction histories appear as quantum probability (limiting projection).
- Stable symbolic compressions appear as mathematics.

This hierarchy preserves the measurable successes of the classical basin while refusing to begin from its infinities. It also explains why unification may be possible within Geofinitism even if it remains difficult or impossible inside classical commitments. The classical theories are separated by their symbolic machinery. Geofinitism asks whether those symbolic machines are different projections of the same finite underlying process within the symbolic realm.

The proposed unifying object is therefore not a field, not a wavefunction, not a manifold, and not a particle.

It is *endogenous finite interaction-density geometry*.

Why Narrative Must Precede Mathematics

This point is vital.

In Geofinitism and Finite Symbolic Mechanics, mathematics cannot be treated as an already-purified language floating above explanation. Mathematics is itself symbolic, finite, embodied, historical, and representational.

The dissolution of invariant base makes this unavoidable. In the work on Alphons and Nexils, a number is not independent of its representation. Every symbolic system carries geometry, uncertainty, and provenance. The classical assumption that the “same” number exists identically across every base is rejected because every mark, pixel, or byte occupies finite space and requires finite work to inscribe or compute.

This means equations themselves are not outside the system.

They are written in an Alphon. They have symbolic geometry. They carry representational cost. They are finite constructions.

Therefore, if one begins with the equation as though it were ontologically primary, one has already lost the Geofinite discipline. The equation may be useful, but it is downstream.

The flow is:

measurement \rightarrow distinction \rightarrow symbol \rightarrow relation \rightarrow narrative \rightarrow comp

Not:

mathematics \rightarrow ontology \rightarrow measurement.

This is why narrative language must give rise to the mathematics. Explanation must first establish the admissible commitments. The mathematics then appears as disciplined compression, not as an imposed external authority.

In classical mathematics, infinity often terminates explanation by placing the problem beyond measurement. It becomes a wall disguised as a horizon. It says: continue the symbolic process indefinitely, and the limit will carry the truth.

Geofinitism refuses that move.

At the Generonic boundary, the correct response is not to invoke infinity. The correct response is to identify the finite mechanism of symbol generation, measurement limitation, uncertainty, and reconstruction.

That is where FSM enters.

Takens and the Operational Leap

The Takens-based work is crucial because it shows that this is not only philosophical pattern-making.

Takens' theorem shows that hidden geometry can be reconstructed from delayed observations. A system's attractor may be recovered from finite scalar observations arranged through delay coordinates. This gives a mathematical and operational bridge between measurement and hidden structure.

In the Geofinite basin, this becomes more than a theorem in dynamical systems. It becomes an epistemic model.

We do not access reality as a complete object.

We reconstruct stable relational geometry from finite observations.

That same principle appears in the reframing of complex numbers, where phase is recovered through delay. It appears in language, where meaning unfolds through symbolic sequence. It appears in AI, where embeddings and trajectories reconstruct semantic structure. It appears in the Takens-Based Transformer (MARINA), where the insight becomes architecture.

This is more decisive. A mere philosophical analogy remains interpretive. However, when a pattern generates a working architecture, it becomes operational. The

Takens-Based Transformer demonstrates that the reconstruction view can produce machinery. It shows that language can be treated not merely as token statistics, but as trajectory reconstruction in symbolic phase space.

This strengthens the wider Geofinite programme. It suggests that the same finite-reconstruction principle may generate not only interpretations of existing mathematics, but new calculational and computational systems.

That is what a future mathematical re-framing of gravity and electrodynamics must eventually do. It must not merely say that gravity and electrodynamics are related. In practice it must produce finite interaction models from which gravitational-like and electrodynamic-like behaviours emerge as limiting projections.

A Careful Statement of the Research Programme

The strongest form of the claim is not:

“Geofinitism has unified physics.”

That would be premature and too prescriptive. Perhaps, a stronger, more disciplined claim is:

Geofinitism provides an admissible finite framework in which gravity and electrodynamics may be treated as limiting projections of a

shared endogenous interaction-density geometry. Classical GR, QM, and Maxwellian electrodynamics are retained as successful external-basin compressions, but their continuum, infinitesimal, and infinite commitments are not admitted as foundations.

This claim is measured. It is clear. It does not overreach. It preserves the value of existing theory while creating room for a deeper reconstruction. The future mathematical development would then proceed by defining within the symbolic realm:

- finite identities (Nexils),
- finite adjacency,
- finite update rules,
- finite phase relations,
- finite interaction density,
- finite curvature as mis-closure,
- finite symbolic representation,
- and the Generonic boundary as the limit of admissible measurement.

From these, one would seek to recover the classical equations as limiting behaviours. If the framework is strong, it should eventually show how Maxwell-like behaviour emerges from phase-coupled nodal updates, and how GR-

like behaviour emerges from accumulated mis-closure in the same nodal system. The unification would not be imposed from above. It would emerge from the finite relational substrate.

Conclusion: The Basin Shift

The core of Geofinitism and Finite Symbolic Mechanics is not anti-mathematical. It is a demand that mathematics return to measurement, symbol, provenance, and finite explanation.

Classical physics remains at the core of modern science. It is a set of extraordinary external-basin compressions. But inside Geofinitism, those compressions must be re-grounded. Their infinities cannot be admitted as foundations. Their continua cannot be mistaken for measured reality. Their symbols cannot be treated as transparent. Their equations cannot be placed before the mechanisms of symbol generation and Geofinitism and FSM aims to recover what they preserve.

- General relativity preserves the relation between interaction density and geometric deviation.
- Electrodynamics preserves phase-coupled relational update.
- Quantum mechanics preserves unresolved relational histories through symbolic probability and phase.

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- Complex numbers preserve delay-reconstructed rotational geometry.
- Mathematics preserves stable symbolic attractors generated by finite measurement and relational reconstruction.

The unifying basin is therefore not a single classical equation, but a finite explanatory flow:

measurement \rightarrow distinction \rightarrow symbol \rightarrow relation \rightarrow geometry \rightarrow inter

That is the Geofinite inversion, not mathematics first, reality second. But finite knowing first, symbolic compression second, mathematics third. And at the edge of all of it stands the Generonic boundary: not as a failure, but as the honest limit where science remains science because it remembers that every explanation must eventually return to measurement.