

Galaxies and Discourse: Toward a Teleological Field Theory

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Abstract

Since the seventeenth century, science has excluded *causa finalis* from its conceptual framework, rendering teleological structures invisible even where their effects are manifest. This paper proposes a mathematical rehabilitation of final causation within a quaternionic Hilbert space. Two seemingly unrelated anomalies are addressed in parallel: the stabilization of meaning in discourse and the flat rotation curves of galaxies.

In semantics, discourse does not disperse indefinitely but organizes itself around attractors such as justice or truth. These attractors act as teleological vectors in the imaginary subspace: their influence is strongest when meaning is still unrealized and vanishes at the point of realization. In cosmology, the same formalism reinterprets "dark matter" not as hidden particles but as the effect of an attractor field projected from imaginary dimensions into observable dynamics.

The result is a conceptual unification: teleology emerges as geometry in the appropriate mathematical space. By restoring *causa finalis* to theoretical legitimacy, the model opens a new perspective on both cosmic and semantic order.

1. Introduction: The Missing Field

Modern science is confronted with enigmas that resist explanation within its established framework. In astrophysics, galaxies rotate at velocities that cannot be accounted for by their luminous matter; in human discourse, meaning does not scatter into chaos but stabilizes around enduring themes. At first sight these problems seem entirely unrelated: one belongs to cosmology, the other to linguistics. Yet both point to a missing field, an invisible form of order that binds systems together without itself being directly observable.

Since the seventeenth century, however, science has systematically excluded such fields from consideration. The *causa finalis*—the idea that processes are guided by ends rather than only by origins—was banished from the scientific worldview. As a result, teleological structures remain conceptually invisible, even when their effects are manifest. The discrepancy between visible and effective mass in galaxies, and the resilience of meaning in discourse, both suggest that something essential has been overlooked.

This paper explores the hypothesis that the missing element is a teleological field. Building on earlier work in which semantic attractors were modeled within a quaternionic Hilbert space, we extend the same formalism to galactic dynamics. The aim is not to introduce a

new physical force, but to reinterpret existing anomalies within a richer mathematical geometry—one that restores the *causa finalis* as a legitimate dimension of explanation.

2. From Galileo to Newton: The Ban on Final Causes

Classical philosophy, from Aristotle through the Scholastics, explained natural phenomena by four causes: material, formal, efficient, and the *causa finalis*. Among these, the *causa finalis* referred to the purpose or end toward which a process tends. The scientific revolution, however, systematically excluded this dimension.

Francis Bacon had already dismissed final causes as "barren of effects," warning that they distract from the search for efficient mechanisms. Galileo shifted inquiry from the question of why to that of how, privileging mathematical description over metaphysical speculation. In his famous dictum, "The book of nature is written in the language of mathematics," he expressed the new conviction that the cosmos must be explained through quantitative relations, not purposes or ends. Descartes radicalized this perspective by portraying the universe as a machine whose workings could be reduced to the motion and impact of particles. Newton consolidated the program: his laws of motion and universal gravitation offered unprecedented predictive power, but only by rigorously restricting explanation to efficient causes.

Another factor was cultural. Medieval theology had relied heavily on final causes: the world was interpreted as ordered toward divine purposes. In its struggle for autonomy, early science rejected not only the theological framework but the very notion of finality itself. Teleology came to be seen as a Trojan horse of ecclesiastical authority, and was therefore excluded wholesale from the new, secular conception of nature.

By the nineteenth century, this methodological exclusion had hardened into a defining principle of scientific identity. Rudolf Virchow could thus declare: "Belief begins where science leaves off and ends where science begins." And in another formulation: "The task of science ... is not to attack the objects of faith, but to establish the limits beyond which knowledge cannot go." For modern science, all that transcended measurement and mechanism was not merely unproven, but beyond its proper domain. In this way, *causa finalis* did not vanish—it was rendered conceptually invisible.

3. Semantics: Meaning Attractors

In everyday discourse, words do not drift aimlessly into endless synonymy or contradiction. Instead, conversations converge around recognizable centers of gravity—concepts such as justice, truth, or value. These centers function not as material entities, but as orienting poles that confer stability.

A political debate offers a simple illustration. Opposing parties may disagree vehemently on what constitutes justice—whether it requires equality of outcome, equality of opportunity, or strict adherence to law. Yet in all cases the debate is magnetized by the shared attractor justice. The term does not dissolve into random associations; rather, it organizes discourse,

constraining its trajectories even while its meaning remains contested.

The dynamics of such attractors follow a distinctive pattern. Their pull is strongest when meaning is indeterminate, when words are still at a distance from their semantic goal. Once discourse arrives at the attractor—once consensus on justice or truth is temporarily achieved—the force disappears, for the attractor has fulfilled its function. Teleological power is thus maximal in the unrealized horizon and vanishes at the point of realization.

An instructive analogy can be drawn from galactic dynamics. In the inner regions of galaxies, luminous matter explains much of the observed motion, though deviations already appear. But in the outer regions the discrepancy becomes dominant: stars orbit far too fast to be bound by visible matter alone. It is precisely here, in the periphery, that the invisible attractor field manifests itself most clearly. The semantic field behaves in a strikingly similar way: the more words risk dispersion at the margins of discourse, the more strongly they are drawn back toward the invisible center.

Formally, one may think of a discourse trajectory as a vector $\Psi(t)$ in a high-dimensional semantic space. Its evolution is not linear but asymptotic:

$$\lim_{t \rightarrow \infty} \Psi(t) = A^* .$$

Here A^* does not denote a separate entity but the limiting orientation of the trajectory itself. The dynamics behave as if guided by an attractor, though in fact the curvature of the path arises from the inner structure of the semantic field. The effective pull vanishes precisely in the limit, when the orientation has been realized. This simple scheme prepares the ground for a more rigorous formulation in the quaternionic Hilbert space.

4. Mathematical Formulation

To formalize teleological dynamics, a simple extension from the real to the complex numbers is not sufficient. A complex Hilbert space provides only one imaginary axis, which can encode the oscillation between actuality (real part) and potentiality (imaginary part). But teleology is not one-dimensional: purposes can be oriented in different, even orthogonal, directions.

For this reason, we employ the quaternionic number system H , defined as

$$q = a + bi + cj + dk, \text{ with } i^2 = j^2 = k^2 = ijk = -1.$$

Here a represents the real component (actuality), while bi, cj, dk span a three-dimensional imaginary subspace (potentiality and goal-orientation). A state $S_t \in H$ can thus be written as

$$S_t = R + I_i i + I_j j + I_k k,$$

with R denoting the actual state and (I_i, I_j, I_k) its orientation in the space of teleological possibilities.

Teleological dynamics then appear as a gradient flow in the imaginary subspace:

$$dS_t/dt = -\nabla V_{teleo}(I_i, I_j, I_k),$$

where V_{teleo} is the potential associated with attractors. The real projection P_R yields the manifest trajectory, while the imaginary components encode invisible orientations toward future ends.

In this way, teleology becomes a geometric feature of the quaternionic Hilbert space: goals remain always imaginary, distributed across three orthogonal directions. The real part captures actuality; the imaginary triad represents the space of orientation.

5. Cosmology: Dynamics in the Imaginary Field

The same formalism can be applied to galaxies. Since the 1970s, detailed observations of galactic rotation curves—most prominently by Vera Rubin and her collaborators—have revealed a striking anomaly. According to Newtonian dynamics, orbital velocity should decrease with distance from the galactic center, once the visible stars and gas no longer contribute significantly to the enclosed mass. Instead, the observed curves remain flat, with stars at large radii orbiting far faster than visible matter could sustain.

Standard cosmology accounts for this discrepancy by positing dark matter: an invisible substance permeating the entire galactic system, outweighing luminous matter by roughly a factor of five. Although indispensable for current models, the physical nature of dark matter remains elusive: decades of laboratory searches have not detected the proposed particles.

Alternative approaches have been proposed. Modified Newtonian Dynamics (MOND) alters the law of gravity at low accelerations; emergent gravity theories suggest that gravity itself arises as a statistical or entropic effect. These models share a common aim: to explain flat rotation curves without invoking exotic matter. Yet they remain tied to the framework of efficient causality, modifying forces or laws rather than questioning the ontological space in which they are defined.

In our framework, the anomaly is reinterpreted. What astrophysics calls dark matter does not correspond to an additional substance, but to the effect of an attractor field operating in the imaginary subspace. There is no ideational mass localized in the galactic nucleus; rather, the system behaves as if an invisible mass were present. The attractor's influence is strongest at the periphery, where orientation exerts maximal effect, and vanishes once its end has been realized.

The semantic analogy clarifies this point. Discourse does not require hidden content to explain its coherence; it is stabilized directly by the invisible pull of attractors. In the same

way, galaxies remain coherent not because of unseen particles, but because their dynamics are oriented by an invisible teleological geometry projected into physical reality.

6. Philosophical Consequences

If this framework is accepted, teleology is no longer a relic of pre-modern speculation, but a structural feature of reality once the appropriate mathematical space is chosen. The quaternionic Hilbert space provides the geometry in which goals and purposes can be rigorously described: not as mystical forces, but as vectors of orientation.

The crucial point is that these dimensions are not subject to empirical measurement. Unlike ordinary spatial dimensions, which can in principle be probed by experiment, the imaginary axes of quaternionic space exist only as conceptual coordinates. They are introduced to capture a form of causation that is otherwise invisible: orientation toward future ends.

This limitation is not a weakness but a philosophical consequence. By their very nature, goals are not objects of observation; they manifest only through their effects in the real domain. Teleology, in this sense, is not an additional "thing" in the universe, but a dimension of order revealed in projection. To rehabilitate *causa finalis* thus means to recognize that not all effective fields are measurable in the same way. Some act from the horizon of the possible rather than from the registry of the actual.

Seen in this light, the long-standing exclusion of final causes from science appears less as a refutation than as a methodological blind spot. By restricting itself to efficient causes, modern science achieved predictive power at the cost of rendering teleological fields conceptually invisible. A quaternionic extension restores their legitimacy: teleology emerges as geometry in the right space, not as theology or metaphysics in disguise.

7. Conclusion: Galaxies as Symbols of Thought

Galaxies and minds mirror one another. Both display a coherence that cannot be explained by visible elements alone. In discourse, words are oriented by invisible attractors such as justice or truth; in galaxies, stars trace orbits sustained by fields that do not register as matter. In both cases, what is observed is the projection of an orientation rooted in dimensions that are not themselves measurable.

The parallel suggests that galaxies may be read as symbols of thought. They reveal in the macrocosm what is at work in the microcosm: an invisible teleological geometry, strongest at a distance, vanishing at the point of realization, and perceptible only in projection.

The return of *causa finalis* in this context does not imply a regression to scholastic metaphysics, but its mathematical rehabilitation. Teleology is neither supernatural nor theological: it is geometry in the right space. If galaxies hold together through what physics calls "dark matter" and discourse coheres through what philosophy calls "meaning," then both phenomena point toward the same deeper structure. Reality itself may be understood

as the unfolding of invisible attractors in a quaternionic space of possibilities, revealed only in their effects.

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