Why Realization Requires a Universal Norm: Distinguishability, Objecthood, and the Foundations of Physics

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Abstract

Contemporary physics posits a universal speed limit while simultaneously accommodating rest, variable process rates, and relativistic time dilation. This paper argues that the relevant universal constant should be understood not as a physical speed, but as a *universal norm of realization*—an ontological invariant governing the transfer of distinguishability.

Three independent arguments establish that realization requires an invariant norm: (1) variable norms introduce non-functional ontological structure incompatible with parsimony; (2) interobjective comparison and temporal ordering presuppose a common measure; (3) stable objecthood, understood as closed cycles of realization, demands reparameterization-invariant circulation.

On this basis, motion is reinterpreted as redistribution of realization, rest as maximal internal realization, time as a derived count, and fields as stabilized derivative structures. The framework introduces no new physical postulates but clarifies the ontological conditions under which relativistic theories are possible. The main contribution is to show that the universality of the invariant norm is not a contingent physical fact but a structural necessity for any coherent ontology of objects, processes, and time.

Keywords: philosophy of physics, ontological realization, invariance principles, objecthood, relational time,structural realism

1 Introduction: The Conceptual Tension

Modern physics is structured around the existence of a universal speed limit. This limit plays a foundational role across relativistic theories, constraining causal structure and kinematical relations [1, 2, 3]. At the same time, the very same theoretical framework accommodates a wide range of seemingly incompatible features: material objects can be at rest, processes unfold at different rates, and time dilates without any notion of an absolute slowing of physical activity. A universal limit coexists uneasily with rest, variable process rates, and relative temporal flow—a persistent conceptual tension [4, 5].

Standard responses to this tension typically proceed in one of two directions. The first geometrizes the problem by embedding the speed limit into the structure of spacetime itself [2, 6]. On this view, the universal constant reflects the geometry of a four-dimensional manifold, and phenomena such as time dilation are explained as geometric effects [7]. The second response treats time as a primitive parameter, accepting differential temporal rates as fundamental facts requiring no deeper explanation [8, 9]. While both approaches are formally successful, neither directly addresses what, at a more basic ontological level, is constrained by the universal constant.

The difficulty is this: if nothing ever exceeds the universal limit, what exactly is subject to that limitation? It cannot be straightforwardly identified with the motion of objects through space, since objects may remain spatially at rest. Nor can it be identified with the passage of time itself, since temporal slowing does not correspond to any global reduction of physical activity. The familiar slogan that "everything moves at the speed of light through spacetime" gestures toward a resolution, but does so at the cost of importing geometric structure as an explanatory primitive rather than accounting for it [10].

This paper takes a different approach. Instead of asking how the universal limit constrains motion within spacetime, it asks what ontological role such a limit must play in order for stable objects, comparable processes, and temporal ordering to be possible at all. The guiding idea is that the universal constant does not primarily restrict motion or time, but governs the conditions under which physical distinctions can be realized and maintained [11, 12].

Accordingly, the paper develops an ontological framework in which realization, rather than spacetime structure, is taken as fundamental. Without presupposing any specific geometry or kinematics, it investigates what must be invariant in order for realization to support objecthood, interobjective comparison, and temporal order. The aim is not to reinterpret relativity, but to clarify the conditions of possibility that make theories with universal limits, relative motion, and derived time coherent in the first place [13].

How the Realization Norm Relates to Physical Quantities

The universal realization norm C is introduced as an ontological invariant: a constraint required for objecthood, interobjective comparability, and temporal ordering. It is therefore not, by itself, a physical constant with fixed units, nor does the present framework attempt to predict any numerical value. Rather, the claim is representational: in any successful physical theory that coordinatizes processes by a universal invariant, that invariant can be interpreted as an effective representation of the deeper ontological constraint identified here.

Special relativity provides a canonical example of such a representation. In Minkowski formalisms, the constant c functions as the universal conversion factor that fixes the invariant norm structure used to compare and coordinate processes. On the present view, c is not identified with C simpliciter; instead, c is the theory-specific constant that appears when the ontological invariant C is expressed within a particular kinematical representation (spacetime geometry, units, and operational conventions). Thus, the relation is one of representational realization: c is a physical encoding of the ontological invariance requirement, not its ground.

Similarly, mass–energy and field quantities are not derived here as physical magnitudes. The framework only proposes an ontological reading: “mass” corresponds to the degree to which realization is bound into internally closed patterns (stabilizing identity), while “fields” correspond to stabilized derivative summaries of systematic reorientations across extended descriptions. These are interpretive identifications at the level of explanatory role, not reductions or new dynamical laws.

1.1 Scope and Limitations

This paper does *not*:

- Propose a new physical theory or modify existing theories
- Derive empirical predictions distinct from those of special relativity
- Offer a quantum or gravitational extension of the framework
- Claim that physicists should abandon geometric or dynamical formulations

Rather, it investigates the *ontological preconditions* that make such formulations possible. The question is not “what laws govern the universe?” but “what must be invariant for there to be stable objects, comparable processes, and temporal order at all?” [14, 15].

On Numerical Values and Empirical Adjudication

The present argument does not explain why any particular physical constant takes the numerical value it does. Its claim is conditional: if a world admits stable objects, interobjective comparison, and coherent temporal ordering, then some invariant norm must be instantiated in any adequate physical representation. Empirical theories fix numerical values by measurement and convention; the ontological framework fixes the role that such values must play.

Accordingly, the framework is not tested by novel predictions but by comparative explanatory adequacy: it is supported insofar as it clarifies why invariant-structure formalisms (e.g. those employing universal norm constraints) are not optional add-ons but conditions of coherent coordinatization. Where two interpretations are empirically equivalent (e.g. spacetime realism vs. realization-norm ontology), the intended adjudication criteria are parsimony of primitives, transparency of explanatory direction, and avoidance of ontological inflation.

Roadmap

Section 2 fixes the methodological stance (ontological, not dynamical) and the transcendental strategy. Section 3 introduces distinguishability and realization, and motivates the minimal phase-structural vocabulary. Section 4 establishes, by three independent arguments, that realization requires an invariant norm under the requirements of parsimony, interobjectivity, and closure. Section 5 provides a minimal toy model demonstrating constructive coherence. Section 6 derives the conceptual consequences (motion, rest, time, and derived structures). Section 7 situates the view relative to spacetime realism, process ontology, relational time, and structural realism, and addresses standard objections.

2 Methodological Preliminaries

2.1 The Ontological vs. Physical Distinction

This paper operates at the level of *ontological analysis*, not physical theorizing. The distinction is crucial [16, 17]:

Physical theories specify laws, equations, and empirical predictions. They answer questions like "How do systems evolve?" and "What will we observe?"

Ontological frameworks specify the categories and structures that make physical theories intelligible. They answer questions like "What must exist for these laws to apply?" and "What are the identity conditions for the entities described?" [18, 19].

The present framework is ontological in this sense. It does not compete with special relativity any more than a theory of objecthood competes with thermodynamics. Rather, it clarifies what must be invariant for relativistic (or any) theories to describe a world of stable objects, comparable processes, and temporal order [20].

2.2 The Role of Transcendental Arguments

The arguments in Section 3 are *transcendental* in structure: they identify conditions without which certain phenomena—objecthood, interobjective comparability, and temporal ordering—would be impossible [13]. Such arguments do not proceed by empirical generalization but by conceptual analysis of what is presupposed by the intelligibility of the phenomena in question.

This mode of reasoning is standard in metaphysics (e.g., Kant's transcendental deduction and Strawson's descriptive metaphysics) and in foundational physics, where symmetry principles and conservation laws function as conditions of intelligibility rather than as empirical regularities [21, 22].

In this respect, the present approach aligns with ontic structural realism, according to which invariant structures, rather than individual entities, carry primary ontological commitment [12]. The novelty of the present analysis lies in applying this strategy not to spacetime geometry or field structure, but to realization itself, understood as the transfer of distinguishability. The invariant norm is thus not introduced as a physical law, but as a structural condition on what can count as a coherent realization at all.

Operationalization: What Can (and Cannot) Be Measured

No primitive observable directly measures "realization" as introduced here, because the framework is prior to the introduction of spacetime, dynamics, and measurement theory. However, once an empirical theory provides an operational coordinatization (clocks, rods, field strengths, energy-momentum exchange), the framework supplies an interpretive constraint: any successful coordinatization that supports stable objects and interobjective time must implicitly implement a universal invariant norm across these operational procedures.

In relativistic representations, proper-time comparisons among ideal clocks, invariant interval structure, and universal limiting signal behavior can be treated as operational proxies for the invariant role of the realization norm. The framework therefore constrains interpretation rather than proposing a new apparatus: it predicts not new numbers, but that any empirically adequate scheme of interobjective coordination will instantiate an invariant norm structure (or else pay the price in objecthood/comparability spelled out in Sections 4–6).

2.3 The Realization Norm and the Physical Constant c

The universal realization norm introduced in this paper must not be identified *a priori* with any specific physical constant. In particular, it is not defined as the speed of light. Rather, the claim is ontological: any physical theory capable of supporting stable objecthood, interobjective comparison, and coherent temporal ordering must instantiate an invariant norm governing realization, independently of its concrete physical representation.

This perspective resonates with earlier distinctions between the velocity of light and the invariant constant entering spacetime structure. As emphasized by [23], the constant c plays a dual conceptual role in relativistic physics: it appears both as the propagation speed of light and as a structural invariant constraining kinematics and causal structure. The present framework radicalizes this distinction by relocating the invariant from spacetime geometry to the level of realization itself.

Relatedly, interpretations of c as a normative magnitude of four-dimensional motion rather than a mere coordinate speed have been explored in operational and foundational contexts [24]. Such approaches remain within relativistic kinematics, whereas the present analysis operates at a prior ontological level: the realization norm is not derived from spacetime structure but instead constrains the conditions under which spacetime representations can be meaningfully instantiated. In this sense, the realization norm fixes a representational role that physical constants may occupy, without fixing their empirical interpretation or numerical value.

Accordingly, physical constants such as c are best understood, within this framework, as theory-specific reconstructions of a deeper ontological constraint. The direction of explanation is therefore one-way: ontological invariance constrains admissible physical theories, not vice versa.

3 Ontological Framework: Distinguishability and Realization

3.1 Distinguishability as a Primitive

The framework developed in this paper takes *distinguishability* as an ontological primitive. Distinguishability is neither an object, nor a property, nor a relation between pre-existing entities. Rather, it functions as a minimal condition for the possibility of non-coincidence. To be distinguishable is to admit the possibility of being realized as not identical to another realization, without yet presupposing identity, persistence, or stability.

Importantly, distinguishability is introduced without any requirement of preservation or stability. At this level, no claim is made that a distinction must persist, recur, or close into a self-identical structure. Distinguishability merely marks the logical space in which coincidence and non-coincidence can be meaningfully defined at all.

Positive Characterization

Positively, distinguishability is introduced as the minimal structural capacity for non-coincidence among realizations: a constraint on admissible identifications rather than a property borne by pre-given individuals. Unlike "difference" or "non-identity", which typically presuppose an identity criterion over a domain of entities, distinguishability is defined prior to such a domain: it marks which realizations can fail to coincide under admissible re-descriptions. In this sense, it is not a weaker synonym for non-identity, but a pre-individuation notion that makes later identity conditions possible.

Distinguishability vs. Information-Theoretic Distinctions

This notion must be sharply distinguished from information. Information presupposes encoding, transmission, and interpretation within a representational framework, whereas distinguishability precedes any such structures. Similarly, distinguishability is not reducible to physical properties or states, since those already presuppose criteria of identity and individuation.

Information-theoretic distinctions presuppose:

1. a probability space over possible states,
2. an observer or measurement context,
3. a capacity for encoding, storage, and transmission.

None of these are assumed here. Distinguishability is instead understood as a minimal non-coincidence condition between realizations: the weakest ontological condition under which two realizations can fail to coincide. This notion is weaker than identity, which requires reproducibility and persistence, but stronger than mere numerical difference, which already presupposes individuation.

The relationship between these levels can be schematically represented as:

$$\text{Distinguishability} \longrightarrow \text{Identity (via stable realization)} \longrightarrow \text{Observable properties} \longrightarrow \text{Information.}$$

Distinguishability thus grounds the possibility of identity without itself containing any criterion of stability. Identity is not primitive but derivative: it arises only if and when distinguishability is realized in a way that admits reproduction across admissible transformations. Without distinguishability, nothing can be identified; without further conditions, however, nothing need yet persist.

3.2 Realization as Transfer

Distinguishability, taken by itself, is not sufficient for ontological effectiveness. For a distinction to enter into the domain of existence, it must be realized. At its most minimal level, realization is defined as a *transfer* or actualization of distinguishability: an event or process in which a distinction becomes instantiated in some configuration.

Crucially, realization in this minimal sense does not presuppose stability. A realization may occur once, vary across contexts, or fail to reproduce without thereby losing its status as a realization. Stability, persistence, and closure are not built into the concept of realization itself; they will be introduced later as additional conditions required for objecthood, interobjective comparison, and temporal ordering.

Existence, at this stage, is therefore identified not with the instantiation of a substance, but with participation in processes of realization. This already motivates a departure from substance-based ontology toward a process-oriented framework. However, no commitment is yet made to the claim that realized processes must be stable or self-identical across contexts.

Transfer Without Spatial Transport

The term "transfer" must not be understood as spatial displacement. It designates a structural transformation in which:

- a configuration of distinguishability is actualized in a different structural context,
- no background space or carrier is presupposed,
- no requirement of invariance or preservation is imposed at this stage.

Formally, transfer may be represented as a morphism between configurations of distinguishability, where morphisms encode admissible transformations rather than motions in space. At this level of description, no metric, measure, or norm is assumed. In particular, realization does not yet involve any notion of a universal magnitude, rate, or conserved quantity.

Only when realizations are required to be composable, comparable, and reproducible across contexts does the introduction of additional structure become unavoidable. The norm of realization is therefore not part of the definition of transfer itself, but arises later as a constraint on families of realizations that are to support stable identity, interobjective comparison, and closure.

This is analogous to the role of gauge structure in physics: gauge transformations are defined prior to the introduction of gauge-invariant quantities. Similarly, realization is defined prior to the introduction of an invariant norm. The norm does not make realization possible; it makes stable, comparable, and object-supporting realization possible.

3.3 Phase Structure of Distinguishability

Realization does not occur in an undifferentiated manner. The transfer of distinguishability admits multiple directions of organization, which can be systematically represented by introducing a phase structure of distinguishability. This phase structure is not a physical space and does not presuppose any metric or geometry. It is a structural space of possible orientations of realization [20].

Phase Structure: Not a Physical Space

The term "phase structure of distinguishability" is potentially misleading and requires careful qualification. Unlike the phase structure of classical mechanics (which presupposes configuration space and momentum space), the phase structure introduced here:

1. Has no metric prior to the introduction of the realization norm
2. Does not presuppose spatial or temporal dimensions
3. Represents *orientational degrees of freedom* in how realization can be structured, not locations or momenta

A better analogy might be the space of internal symmetries in gauge theory, where "directions" correspond to transformations that leave certain structures invariant, rather than to spatial displacements [25, 26].

Within this space, we must distinguish between two classes of directions. **Internal directions** correspond to cyclic or closed patterns of transfer that support stability and identity. **Extended directions** correspond to open, projective patterns that allow realization to be distributed across distinguishable contexts.

The orthogonality between internal and extended directions is not geometric orthogonality in a metric space, but *functional independence*: redistribution along one direction does not automatically affect the other. If a magnitude of realization is later introduced, orthogonality will be defined by the requirement that this magnitude decompose additively over these independent components.

These directions are not ontologically distinct domains or levels of reality. They represent different structural orientations of the same underlying transfer of distinguishability. The distinction is functional rather than substantive, marking different modes in which realization can be organized [11, 27].

This phase-structural framework provides the minimal vocabulary required for the arguments that follow. It introduces no geometric assumptions and no physical dynamics, but establishes the conceptual space in which the necessity of a universal norm of realization can be assessed.

3.3.1 Methodological Clarification.

The functional independence established in this section constrains admissible realization norms to be decomposable over independent orientations. This requirement alone does not uniquely fix the mathematical form of the invariant. It determines only the class of norms that can support comparison, recomposition, and redistribution across functionally independent modes of realization.

Among norms compatible with symmetry between orientations, additivity under recomposition, and invariance under reparameterization, the quadratic form provides a minimal representative.[1] The quadratic schema is adopted as the weakest norm satisfying these structural constraints without introducing additional primitives, interaction terms, or context-dependent calibration. Its role is methodological rather than geometrical: it fixes a minimal invariance structure required for stable redistribution of realization, not a metric or spacetime geometry.

4 Why Realization Requires a Universal Norm

4.1 Formulation of the Problem

The ontological framework introduced above characterizes realization, at its most minimal level, as a transfer or actualization of distinguishability. At this stage, realization is not assumed to be stable, reproducible, or closed. A realization may be singular, context-dependent, or non-recurrent without thereby losing its status as a realization.

The problem addressed in this section therefore does not concern realization as such. Rather, it concerns the additional conditions under which realization can support a world of stable objects, interobjectively comparable processes, and temporal ordering.

Against this background, a crucial question arises. Suppose that realizations admit a norm or magnitude measuring the intensity of realized transfer. Must this norm be invariant, or could different realizations proceed with different norms? In other words: is a spectrum of realization norms ontologically admissible once we require realization to play the roles of objecthood, comparison, and temporal coordination?

Nothing in the bare concept of transfer prohibits variability. One may coherently imagine realizations that differ not only in their structural orientation but also in their magnitude. Variable norms are therefore conceivable. The issue is not logical consistency but ontological adequacy.

The question, then, is not whether realization can vary, but whether a framework that permits variable realization norms can still sustain the phenomena it aims to account for—namely, stable identity, interobjective comparison, and coherent temporal ordering. The claim advanced here is that it cannot.

Allowing a spectrum of realization norms does not merely enrich the ontology. It introduces additional distinctions that fail to play any stabilizing or coordinative role and thereby undermine the very functions realization is meant to serve at the

[1] In functional-analytic terms, norms admitting symmetric, additive decomposition over independent components are canonically representable by inner-product norms up to isomorphism. See standard results on the characterization of Pythagorean or Hilbertian norms. No claim of strict mathematical uniqueness is intended here.

level of objects and shared structure. Variability of norm is thus not an innocuous generalization but a source of ontological failure.

The following three arguments establish this result independently. Argument A shows that variable norms introduce non-functional ontological structure incompatible with minimality. Argument B demonstrates that interobjective comparison and temporal ordering require a common unit of realization. Argument C establishes that stable objecthood, understood as ontological closure, is impossible without an invariant measure of realized transfer.

Together, these arguments show that universality of the realization norm is not presupposed by the concept of realization, but is forced by the conditions under which realization can ground a coherent ontology of objects, processes, and time.

Why Additivity is the Minimal Choice

Whenever realizations are composable, a magnitude intended to support comparison must be compatible with composition. Additivity is not assumed as a physical law but as the weakest coherence constraint: composing two transfers should not require extra structure beyond the transfers themselves. Non-additive composition rules are possible, but they thereby introduce additional primitives (interaction terms, context-sensitive calibration, or higher-order coordination) that violate the minimality requirement driving Arguments A–C. Hence additivity is adopted here as a minimal, defeasible constraint on any norm that is to underwrite interobjective coordination.

4.2 Argument A: Ontological Parsimony

Assume that realization admits a spectrum of norms, such that two realizations may differ not only in their structural orientation but also in the magnitude of realized transfer. In that case, an additional distinction becomes ontologically relevant: not merely *how* a distinction is realized, but *with which magnitude* it is realized.

The crucial question is whether this additional distinction plays any functional role in realization itself. At the level of minimal realization—as the transfer or actualization of distinguishability—no appeal is yet made to objecthood, closure, or persistence. What is required, however, is that realized distinctions be in principle identifiable as realizations, that is, capable of entering into relations of comparison, coordination, or composition with other realizations.

If a difference in realization norm makes no difference to any such relation—if it neither affects how realizations compose, nor how they can be compared, nor how they can be tracked across admissible transformations—then it fails to individuate realizations in any ontologically accessible way. In that case, variability of norm does not merely fail to stabilize objects; it fails to contribute to the individuation of realization itself.

Variability of this kind therefore introduces non-functional ontological structure. It enlarges the space of distinctions without providing any criterion by which those distinctions can count as realized rather than merely stipulated. Within a minimal ontological framework, degrees of freedom that play no role in the identification, coordination, or comparison of realizations have no basis for being treated as fundamental [18, 28].

A Dilemma for Variable Norms

This conclusion can be sharpened by considering the following dilemma.

Horn 1 (Unconstrained variation): If realization norms vary freely, then there is no principled way to distinguish a "slow" realization from a "fast" realization of the same structural transfer. The difference in magnitude does not enter into any rule governing realization, and therefore cannot ground a distinction between realizations. In this case, norm variability is ontologically idle: it does not individuate realization but merely appends an ungrounded label.

Horn 2 (Constrained variation): If, instead, variability of norms is constrained by some principle P, then P itself functions as the genuine invariant of realization. The apparent spectrum of norms is then merely a parametrization of P, and the variability is epiphenomenal. Ontological commitment should therefore be directed to P rather than to a family of variable norms.

In neither case does a spectrum of realization norms constitute an autonomous ontological degree of freedom. Either it is unconstrained and fails to individuate realization, or it is constrained and collapses into a single underlying invariant.

This argument does not rely on prior assumptions about objecthood, closure, or temporal ordering. It concerns the minimal conditions under which differences can count as differences *in realization at all*. Variability that plays no functional role in the transfer, coordination, or comparison of distinguishability cannot be identified as realized variability.

Result A: A spectrum of realization norms is incompatible with ontological minimality, not merely because it fails to support stable objects, but because it fails to individuate realization itself.

4.3 Argument B: Coherence and Interobjectivity

A second argument concerns the interobjective coherence of realization. Temporal ordering, as introduced in this framework, is understood as a count of projected transfer. Counting, however, presupposes a unit. Without a shared measure, there is no determinate sense in which different realizations can be said to proceed at the same rate, faster, or slower [29, 30].

If realization norms vary across processes, then a single act of realized transfer is not directly comparable between realizations. Temporal rates become object- or process-specific, and what remains is not relative time but a collection of incommensurable local markers [31]. At this stage, interobjective temporal ordering is not merely relativized but underdetermined.

A natural objection arises at this point. Why should interobjectivity require a single universal norm? Could one not admit multiple local norms, coordinated by systematic transformations, thereby preserving comparability without a global invariant?

Such schemes are conceivable, but their ontological cost must be made explicit. Any system of transformations between locally normed realizations requires a coordinating structure that specifies how realizations governed by different norms are to be related. This structure cannot be local to any single realization. It must function as a higher-level standard that determines when two realizations count as equivalent, comparable, or composable.

There are only two possibilities. Either the coordinating transformations are governed by a fixed invariant, in which case that invariant plays exactly the role of a universal norm, albeit at a higher level of description. Or the transformations are not governed by any invariant, in which case comparability becomes indeterminate: there is no fact of the matter as to how rates or magnitudes relate across contexts. In both cases, a plurality of local norms fails to eliminate the need for a universal standard; it merely relocates or obscures it.

The present framework explicitly rejects such external coordination. Realization is required to be ontologically autonomous: all conditions for comparison, composition, and temporal ordering must arise from realization itself, not from an additional meta-level of calibration. Interobjectivity without a universal norm is therefore possible only at the cost of introducing external structure that lies outside realization.

Why Interobjectivity is Not Optional

One might further object that interobjectivity itself is optional. Perhaps reality consists of incommensurable process-streams, each with its own internal measure, with no requirement of global comparability.

This objection fails for two reasons.

(1) Causal interaction presupposes comparability. If two processes can interact—if they can jointly determine a third process—then there must be a common basis on which their contributions are combined. Without such a basis, interaction would be indeterminate: there would be no fact of the matter about what the joint effect is [32].

(2) Objecthood presupposes multiple realizations. An object is not defined by a single realization but by the reproducibility of a realization pattern across varying contexts [33]. Assessing such reproducibility requires that different realizations be comparable. Without a universal norm, there is no principled sense in which one can say that the same object persists across distinct realizations.

Interobjectivity is therefore not an optional metaphysical add-on but a precondition for interaction and persistent objecthood. Without a universal norm of realization, neither temporal comparison nor compositional coherence can be defined without importing external coordinating assumptions.

Result B: A universal norm of realization is required for interobjective coherence and temporal ordering, not because interobjectivity is logically impossible without it, but because ontologically autonomous interobjectivity is.

4.4 Argument C: Ontological Closure

Why Closure Enters as a Minimal Identity Constraint

The appeal to closure is not a stipulative definition of objecthood but a minimal constraint on any account that aims to recover re-identifiable objects. To count as an object, a realized pattern must admit identity across admissible re-descriptions (changes of parametrization, coarse-graining, and contextual embedding). This requires that the criterion of "sameness" be invariant under representational choices. In the present framework, closure is the weakest structural form that guarantees such invariance: a pattern that returns to itself under admissible composition provides a representation-independent anchor for re-identification. Non-cyclic stability notions may exist at effective levels, but they presuppose some underlying re-identification condition; closure is introduced here as the minimal structural surrogate for that condition.

The third argument concerns objecthood. Within the present framework, an object is not identified with any realized process whatsoever, but with a *minimally closed* pattern of realization: a configuration in which realized distinguishability returns to itself in a way that supports self-identity across admissible re-descriptions [11, 27].

The appeal to closure is not intended to exhaust all possible forms of stability. Rather, it specifies a minimal criterion for objecthood as such. Closure marks the weakest structural condition under which a realized pattern can be said to be the *same* across multiple realizations, rather than merely persistent, recurrent, or dynamically robust.

Objecthood is therefore not assumed at the level of realization itself. It is introduced as a further criterion: only those realizations that admit closure under admissible composition and reparameterization qualify as objects. Realizations may occur, vary, and even persist without thereby constituting objects in the ontological sense relevant here.

For such closure to be well-defined, the total realization associated with a closed pattern must be invariant. Closure cannot depend on how the realization is segmented, ordered, or parameterized; otherwise, identity would vary with representation rather than with structure.

Closure as an Invariance Condition

Let a closed realization γ be represented as a finite or countable composition of realization events:

$$\gamma = E_1 \circ E_2 \circ \cdots \circ E_n,$$

where each E_i denotes a realization (transfer of distinguishability).

Assume that each realization E_i is associated with a positive magnitude $\|E_i\|$, interpreted as the intensity of realized transfer. No assumption is made at this stage about the invariance or universality of this magnitude.

Define the *circulation* associated with γ as an additive functional:

$$\mathcal{C}(\gamma) := \sum_{i=1}^{n} \|E_i\|.$$

Closure Requirement. A closed realization γ qualifies as an object only if $\mathcal{C}(\gamma)$ satisfies the following conditions:

1. *Recomposition invariance:* $\mathcal{C}(\gamma)$ is independent of how γ is decomposed into constituent realizations.
2. *Reordering and reparameterization invariance:* $\mathcal{C}(\gamma)$ depends only on the closed structure of γ, not on representational choices.

If the magnitudes $\|E_i\|$ vary along the closed pattern, then $\mathcal{C}(\gamma)$ depends on how the realization is segmented or regrouped. The same closed structure may yield different values of $\mathcal{C}$ under different admissible decompositions, resulting in representational drift. In this case, the realization fails to support a stable identity.

Conversely, if all realizations share a common magnitude,

$$\|E_i\| = C \quad \text{for all } i,$$

then $\mathcal{C}(\gamma) = n \cdot C$ depends only on the structural closure of γ and not on its representation. Closure becomes invariant, and objecthood is well-defined.

Theorem 1 (Informal) *A closed realization supports stable objecthood if and only if the magnitude of realization is invariant across its constituent realizations.*

It is important to emphasize that this result does not deny the existence of stable but non-cyclic structures, such as sustained flows, asymptotically stable regimes, or open-ended processes. Such structures may be persistent and dynamically robust at an effective level. The claim is instead that any such stability presupposes an underlying criterion of identity, and that this criterion ultimately requires closure. Cyclic realization provides the minimal and canonical form of such closure, even if it is not always manifest at the level of effective description.

Stability is therefore not introduced as an additional mechanism but as a criterion. Realizations that fail to satisfy this criterion do not lose objecthood due to external disruption; they fail to qualify as objects in the first place.

Result C: Ontological closure and stable objecthood are impossible without an invariant realization norm.

4.5 Summary of Arguments

The three independent arguments developed above converge on a single structural conclusion. Table 1 summarizes their respective roles, failure modes, and ontological status.

Table 1 Summary of arguments for a universal realization norm

Argument	What fails without an invariant norm	Type
A (Parsimony)	Functional individuation of realization (non-idleness)	Structural
B (Interobjectivity)	Interobjective temporal comparison and composition	Structural
C (Closure)	Stable objecthood (identity under reparameterization)	Definitional

4.6 Proposition: Uniqueness of the Realization Norm

The three arguments converge on a single conclusion.

Proposition 1 (Uniqueness of the Realization Norm) *If realization is (i) minimally structured, (ii) interobjectively comparable, and (iii) capable of supporting closed cycles as objects, then the norm of realized transfer must be invariant and universal (up to isomorphism). This is a conditional necessity claim relative to requirements (i)–(iii).*

This proposition does not introduce a new physical constant. It fixes a structural condition that any ontology capable of supporting objects, temporal ordering, and coherent comparison must instantiate. The universality of the realization norm is therefore not a contingent assumption, but a consequence of the conditions under which realization is possible at all [13, 11].

5 Toy Model: Realization in a Minimal Phase Structure

This subsection has a heuristic and elucidatory function. It does not provide an independent motivation for the ontological claims defended above. Instead, the toy model serves to establish their constructive coherence: it shows that the axioms admit non-trivial realizations, that the arguments are not merely verbal, and that the contrast between invariant and variable realization norms leads to sharply distinct structural outcomes.

The model is deliberately minimal. It introduces only those elements required to make the arguments about realization, closure, and comparability explicit.

5.1 Definition of the Toy Model

Consider a minimal phase structure consisting of a space of possible orientations of realization with two orthogonal directions. These directions are not spatial or temporal dimensions; they represent distinct structural modes in which realization can be organized.

Let realization be represented by a morphism acting in this phase structure. The morphism encodes the transfer of distinguishability and is characterized by a positive norm, denoted $\|E\|$, which measures the magnitude of realized transfer. At this stage, no assumption is made about whether this norm is invariant or variable.

Within this minimal structure, a cycle of realization is defined as a closed composition of such morphisms. A cycle is intended to represent the minimal condition for objecthood: a pattern of realization that returns to itself and can therefore support identity.

5.2 Variable Norm Scenario (Failure Case)

First, consider the case in which realization admits a spectrum of norms. Different segments of a realization cycle may then be associated with different values of $\|E\|$.

In this scenario, the total measure of realization around a cycle depends on how the cycle is decomposed. Reparameterizing the same structural path—by subdividing or regrouping segments—changes the accumulated magnitude of realization. As a result, the closure condition is not invariant under representation.

This dependence has two immediate consequences. First, no cycle defines a stable identity, since the outcome of realization varies with parameterization rather than structure. Second, comparison between cycles becomes ill-defined: two realizations that are structurally identical may nevertheless differ in their total measure solely due to arbitrary segmentation.

Accordingly, the variable-norm scenario fails to support stable objects, intercycle comparability, or any coherent notion of accumulated realization. Identity drifts with representation, and objecthood collapses.

5.3 Constant Norm Scenario (Successful Case)

Now consider the alternative case in which the norm of realization is fixed, such that $\|E\| = C$ for all realizations. In this case, the total measure of realization around a cycle is independent of parameterization. Subdivision or regrouping of segments leaves the accumulated realization invariant.

As a consequence, cycles define stable identities: objecthood is preserved under reparameterization. Moreover, different cycles can be directly compared, since each unit of realization is measured against the same invariant norm. Accumulation and counting become well-defined operations.

In this scenario, the minimal requirements for objecthood, comparability, and ordering are satisfied without introducing any additional structure beyond the invariant norm itself. The model therefore supports exactly those features that fail in the variable-norm case.

5.4 Connection to Physical Examples

The toy model introduced here is not a physical model and is not intended to reconstruct, derive, or reinterpret any existing physical theory. Its role is strictly conceptual. Nevertheless, it is worth noting that the structural features highlighted by the model resonate with familiar patterns that appear in successful physical descriptions.

In particular, physical theories often employ invariant norms to relate quantities associated with different, functionally independent modes of description. Such invariants do not arise arbitrarily, but serve to ensure coherence, comparability, and stability across different representational perspectives. The present framework identifies an analogous requirement at the ontological level: invariance is not introduced to explain empirical data, but to secure the possibility of objecthood and interobjective comparison.

Conversely, theoretical frameworks that lack a unifying invariant typically require additional external structures to coordinate processes and preserve identity. This contrast mirrors, at a purely structural level, the difference between theories in which coherence is enforced by an invariant norm and those in which such coherence must be imposed extrinsically.

These observations are not offered as physical identifications or derivations. They merely indicate that the ontological constraint identified here—namely, the requirement of an invariant norm of realization—is structurally aligned with a broader pattern in theory construction, where invariance plays a central role in securing stability and coherence.

5.5 Interpretation

Although highly abstract, the toy model illustrates the core results of the preceding arguments. The failure of the variable-norm scenario exemplifies the breakdown of ontological closure (Argument C), the loss of interobjective comparability and counting (Argument B), and the introduction of non-functional structure (Argument A). Conversely, the constant-norm scenario demonstrates that invariance of the realization norm is sufficient to secure closure, comparability, and identity within a minimal framework.

The significance of the model lies not in its representational fidelity, but in its structural clarity. It shows that the universality of the realization norm is not an arbitrary stipulation, but a constructive requirement for any ontology that aims to support objects, comparison, and temporal ordering at all.

Methodological Clarification

It is important to emphasize the modal status of the toy model presented in this section. The model is not intended to establish the absolute inevitability of a universal realization norm across all conceivable ontologies. Rather, it demonstrates a form of *conditional necessity.*

The result is this: if one requires an ontology to support minimal objecthood, interobjective comparability, and coherent temporal ordering—understood in the weak, structural senses specified earlier—then an invariant norm of realization is unavoidable. The toy model shows that abandoning the invariant norm is not a neutral modification but entails the loss of at least one of these features.

Ontological frameworks that reject objecthood, interobjectivity, or temporal ordering as fundamental are therefore not refuted by the present argument. They simply target a different explanatory domain. The toy model clarifies the structural price of such rejections and thereby makes explicit the commitments implicit in any ontology that aims to account for objects, shared structure, and time.

6 Consequences: Motion, Rest, Time, and Derived Structures

The preceding sections established that realization requires a universal invariant norm in order to support objecthood, interobjective comparison, and temporal ordering. This section develops the conceptual consequences of that result. The aim is not to derive physical laws, but to show how familiar notions—motion, rest, time, gradients, and fields—emerge as structural derivatives of realization rather than as primitives.

6.1 Motion as Redistribution

Within the present framework, motion is not an additional form of activity superimposed on realization. All realized processes already occur with the same invariant norm. What varies is not the magnitude of realization, but its orientation within the phase structure of possible transfers.

Motion is therefore understood as a redistribution of realization between functionally independent structural directions. No process gains or loses realization in an absolute sense. Instead, realization is reorganized: transfer that is oriented internally becomes partially oriented along extended directions, and conversely [29, 30].

This reorientation yields the structural invariant

$$v_{\text{internal}}^2 + v_{\text{extended}}^2 = C^2, \tag{1}$$

which expresses conservation of the realization norm under redistribution.

For present purposes, the quadratic schema is used only as a canonical representative of symmetric, decomposable invariance constraints. The argument does not require a strict uniqueness theorem; if alternative norm forms satisfy the same invariance and decomposability role without importing additional structure, the subsequent interpretive consequences can be reformulated accordingly.

The quadratic form appearing in this identity is not introduced by analogy with physical kinematics or spacetime geometry. It is fixed by minimal structural requirements on admissible realization norms. Any norm that is (i) invariant under reorientation between functionally independent directions, (ii) symmetric with respect to those directions, and (iii) additively decomposable over orthogonal components is, up to isomorphism, uniquely representable by a quadratic form. No claim is made here about mathematical uniqueness in the strict sense; the quadratic form is introduced as the minimal representative of invariant, symmetric, decomposable norms.

Accordingly, the appearance of squares reflects a classification result about admissible norms under these constraints, rather than the introduction of a geometrical metric or a hidden physical postulate. The identity is a norm-decomposition schema, not a kinematical law or a dynamical equation. It encodes the fact that all realized processes share the same total norm, irrespective of how that norm is structurally distributed.

6.2 Absolute Rest Reconsidered

On this basis, absolute rest can be reformulated. Rest does not correspond to the absence of realization, nor to a cessation of activity. Instead, it denotes a limiting case in which realization is entirely internally oriented [3].

An object at rest relative to extended directions realizes the full invariant norm internally. Such internal realization takes the form of closed, cyclic transfer, which supports stability and identity. In this sense, rest corresponds to maximal internal realization, not to minimal activity.

Within this framework, mass is naturally interpreted as a structural feature of realization: it reflects the degree to which realization is bound into closed internal cycles rather than distributed across extended orientations [25]. This interpretation does not replace physical accounts of mass, but clarifies its ontological role as a mode of stabilized realization.

6.3 Time as Projection and Count

Time, in this ontology, is not a fundamental parameter. It arises only when realization is projected onto extended directions that admit ordering and comparison. Temporal magnitude is therefore defined as a count of realized transfer under such projection [30, 34].

Because the norm of realization is invariant, temporal slowing does not correspond to any global reduction of activity. Instead, it reflects a change in orientation: as more realization is bound internally, less is available for projection, and the count proceeds more slowly relative to other realizations [31].

Temporal dilation is thus a structural effect of reorientation rather than a modification of realization itself. Nothing ever "slows down absolutely"; only the projection used for temporal counting changes [35].

The treatment of time as a derived quantity aligns with relational and non-fundamental approaches developed in both physics and philosophy. In particular, time has been argued to emerge from correlations between processes rather than functioning as a primitive parameter [29, 30]. What distinguishes the present account is the identification of a universal realization norm as the condition that renders such relational time interobjectively comparable.

Without a shared unit of realization, temporal ordering would fragment into incommensurable local measures. The invariant norm thus plays a role analogous to that of a common clock standard, while remaining ontologically prior to any specific temporal or geometric representation [36].

6.4 Equivalence of Internal and External Distinctions

The distinction between internal and extended orientations must not be misconstrued as an ontological dualism. These are not different kinds of being, nor different levels of reality. They are orthogonal decompositions of one and the same transfer of distinguishability governed by a single invariant norm.

Internal and external distinctions are therefore ontologically equivalent. Neither constitutes a privileged source of dynamics, and neither introduces an independent degree of freedom. Their difference is purely structural and functional, reflecting alternative modes in which realization can be organized [11, 27].

This equivalence is crucial. It prevents the introduction of hidden substances, background dynamics, or asymmetric ontological commitments. All realized distinctions are manifestations of a single underlying process, differently oriented.

6.5 Gradients and Fields as Derived Structures

Gradients do not appear as fundamental elements in this framework. They arise only at the level of effective description, when collections of realizations admit local ordering and smooth approximation. In such contexts, a gradient represents a local imbalance in the orientation of realization across neighboring regions [25, 37].

Importantly, gradients do not reflect variations in the norm of realization, which remains invariant. They capture patterns in how realization is redistributed spatially within an effective description.

Fields emerge at a further derivative level. A field corresponds to a stabilized pattern of gradients that remains coherent relative to a class of objects [26]. Fields are thus not ontologically primitive carriers of interaction, but structured summaries of how realization is systematically oriented and redistributed in a given context.

On this view, gradients and fields are tools of coordination and stabilization within effective descriptions. They express higher-level regularities of realization without introducing new fundamental entities.

6.6 Analogy with Gauge Invariance

The framework developed here bears a structural analogy to gauge theories in physics [25, 37]. In gauge theory:

- Physical content is invariant under certain transformations (gauge transformations)
- Observable quantities are those that remain unchanged by these transformations
- The gauge principle constrains the form of physical laws

Similarly, in the present framework:

- Ontological content (objecthood, identity) is invariant under reparameterization of realization
- Stable structures are those that remain unchanged by such reparameterization
- The invariance of the realization norm constrains what can count as an object

This analogy suggests that the realization norm plays a role analogous to a gauge symmetry: it is not an additional physical quantity but a constraint on how physical quantities can be meaningfully defined [26].

However, there is a key difference: gauge invariance is a property of physical theories, whereas realization invariance is a property of ontology itself. Gauge theories presuppose objects and processes; realization theory explains what makes such presuppositions coherent.

6.7 Summary

The ontology developed here reinterprets central physical notions without inflating the ontology. Motion becomes redistribution, rest becomes maximal internal realization, time becomes a count of projection, and gradients and fields become stabilized derivative structures. None of these concepts requires independent ontological status.

Taken together, these consequences demonstrate the explanatory economy of the framework. By fixing a single universal norm of realization, a wide range of familiar structures emerge as necessary and intelligible without appeal to primitive geometry, absolute time, or additional dynamics.

Methodological Remark: Ontology and Physical Reconstruction

Given the proximity of the present framework to familiar relativistic structures, a methodological clarification is in order. The universal norm of realization introduced in this paper is not motivated by, derived from, or identified with any physical constant. In particular, it must not be read as a redefinition or ontological elevation of the speed of light.

The direction of explanation is strictly one-way. The ontological analysis precedes physical theory and aims to articulate conditions of possibility for objecthood, interobjectivity, and temporal ordering. Physical constants and spacetime structures, insofar as they exhibit universal invariance, may be interpreted as *reconstructions* or effective representations of this deeper ontological constraint. They do not motivate it.

Any attempt to read the ontology backward—by inferring the universal realization norm from known physical laws—misses the methodological point of the analysis. The framework does not explain why particular physical constants take the values they do, nor does it privilege relativistic physics over alternative theories. Its claim is more modest and more general: any physical theory that successfully supports stable objects, interobjective comparison, and coherent temporal order must instantiate, in some form, an invariant norm of realization.

7 Relation to Existing Approaches

The ontological framework developed in this paper is not intended to replace existing approaches in the philosophy of physics, nor to compete with established physical theories. Its aim is instead to clarify a structural role that remains implicit or unaddressed within several influential traditions. This section briefly situates the present proposal relative to four such approaches.

Positioning Relative to Recent Interpretive Proposals

Recent interpretive work has emphasized that the constant c plays more than the role of an ordinary speed parameter, functioning instead as an invariant-structure constraint within relativistic coordinatization. The present proposal aligns with this general insight but relocates its explanatory ground: the invariance is treated as an ontological condition of realization, prior to spacetime geometry. Related interpretive strategies (including operational analyses of relativistic motion and time, and proposals that compare multiple realist packages for relativistic invariants) provide useful foils for clarifying what is distinctive here: the aim is not to reinterpret relativistic formalism, but to justify why any empirically adequate coordinatization must instantiate a universal invariant norm once objecthood and interobjective comparison are required.

7.1 Spacetime Realism

Spacetime realist approaches account for the universal speed limit by embedding it directly into the geometry of spacetime [2, 3, 6]. On this view, constraints on motion and temporal relations are explained as consequences of geometric structure. While formally powerful, this strategy treats geometry as explanatorily primitive [5].

The present framework differs by asking what must be invariant prior to any geometrical interpretation in order for such geometry to be meaningful at all. In this sense, spacetime realism is seen as a reconstruction of structural consequences rather than an account of their ontological preconditions [14, 15].

7.2 Process Ontology

Process ontologies emphasize becoming, activity, and change as ontologically fundamental, aligning naturally with the rejection of substance-based metaphysics and the primacy of dynamics [38, 39, 40]. In this respect, the present framework shares with process ontology the view that processes, rather than enduring substances, constitute the basic ontological currency.

However, classical process philosophies typically refrain from postulating a universal invariant constraining realization or process-transfer itself. As a result, they leave open the question of how stable identity, interprocess comparability, and ontological closure are secured across distinct processes and contexts [40].

By contrast, the ontology of realization developed here introduces an invariant norm as a necessary condition for closure, comparability, and objecthood. The framework thus supplements rather than reiterates process ontology: processes are taken as fundamental, but only those governed by an invariant realization norm can support stable objects and shared temporal structure.

7.3 Relational Accounts of Time

Relational theories of time deny that time is a fundamental parameter, instead deriving temporal order from relations between processes or events [29, 30, 41]. The framework developed here shares this rejection of primitive time. However, relational approaches typically do not specify a universal norm that underwrites temporal comparison [31]. As a result, temporal relations risk becoming purely local or system-relative.

By contrast, the present account identifies a shared realization norm as the condition that makes relational time interobjectively comparable [35].

7.4 Structural Realism

Structural realism holds that structure, rather than individual entities, constitutes the primary content of scientific theories [11, 16, 17]. While this position successfully avoids commitment to unobservable substances, it often remains silent on how structures themselves are realized and stabilized [42].

The ontology of realization proposed here addresses this gap by providing a mechanism through which structures can be maintained, compared, and closed. In this sense, the present framework can be seen as offering an ontological grounding for structural realism rather than an alternative to it [13, 20].

7.5 Summary

In each case, the present approach does not reject existing frameworks but identifies a common omission: the absence of an explicit account of the invariant conditions required for realization. By introducing a universal norm of realization prior to geometry, time, and dynamics, the framework clarifies how diverse theoretical structures can be coherently instantiated without ontological inflation.

Comparative Advantages (Summary)

Compared to spacetime realism, the framework (i) reverses explanatory direction by treating invariant structure as grounded in realization rather than taking geometry as primitive; (ii) explains why a universal invariant is required even before committing to spacetime ontology. Compared to standard process ontologies, it (iii) supplies a minimal invariant needed to secure re-identifiable objects and interobjective coordination. Compared to ontic structural realism, it (iv) adds an explicit account of how structures are stabilized and compared via realization. Finally, compared to purely operational approaches, it (v) clarifies the ontological preconditions under which operational coordination is possible, and (vi) makes explicit which additional structures are imported when one allows only local norms or external calibration.

8 Objections and Replies

8.1 Objection 1: "This is just a reformulation of special relativity"

The present framework does not reinterpret or modify special relativity. The universal norm discussed here is introduced prior to any geometrical or kinematical reconstruction and is not identified with a physical speed without further assumptions. Relativistic spacetime structures arise, at most, as downstream representations of this norm rather than as its ontological basis.

Three key differences distinguish this framework from special relativity:

(1) Ontological priority: SR treats the invariant interval as a geometric fact about spacetime [2]. The present framework derives the necessity of an invariant norm from conditions on realization, *prior to* any geometric interpretation.

(2) Generality: The arguments here apply to any ontology of processes, not only to relativistic physics. Even in a non-relativistic world, if objecthood and comparability are to be possible, some invariant norm is required.

(3) Explanatory direction: SR explains time dilation and length contraction as consequences of spacetime geometry [1]. Here, these phenomena are reinterpreted as consequences of realization redistribution. The geometric structure of SR is then understood as a *representation* of this more fundamental ontological structure, not as its ground.

To claim that this is "just SR" is like claiming that a proof of the Pythagorean theorem in terms of area is "just" a proof in terms of coordinates. The content may be related, but the conceptual foundations differ.

8.2 Objection 2: "Time disappears from the ontology"

Time does not disappear, but is denied fundamental status. Temporal order and duration are retained as derived quantities, defined through the counting of projected realization. This preserves all operational uses of time while clarifying that temporal measures depend on structural orientation rather than on a primitive temporal flow [30, 34].

8.3 Objection 3: "Why assume orthogonality between internal and extended directions?"

Orthogonality is not an independent metaphysical postulate but a structural condition required to preserve the invariance of the realization norm under redistribution. Without orthogonality, reorientation would alter total realization and undermine comparability and closure. Orthogonality therefore follows from the requirement of invariant realization rather than being imposed ad hoc.

Why Two Classes of Directions?

The distinction between internal and extended directions is not arbitrary. It arises from a functional requirement:

Internal directions must support *closure*: cycles of realization that return to themselves and thereby constitute stable objects.

Extended directions must support *projection*: patterns of realization that can be ordered, counted, and compared across different objects.

These are minimal requirements for any ontology that includes both objects and temporal order. The question is not "why two?" but "why not fewer?"

- **One direction only:** If all realization were internal, there would be no temporal ordering or spatial extension—only isolated, timeless objects. If all realization were extended, there would be no stable objects, only undifferentiated flux.

- **More than two:** Additional directions would require independent justification. What functional role would a third class of directions play? Without such a role, additional directions violate parsimony (Argument A).

The number of internal directions (e.g., three spatial dimensions' worth of internal structure) is not determined by the present framework, which operates at a higher level of abstraction. The framework requires only that there be *some* internal structure capable of supporting closure, and *some* extended structure capable of supporting projection.

8.4 Objection 4: "This is merely verbal"

The charge that this framework is "merely verbal" can be refuted by showing that it has *structural consequences* that are not captured by standard approaches.

Structural consequence 1 (Toy model): The framework entails that ontologies permitting variable realization norms cannot support stable objecthood. Section 4 establishes this result constructively: in the variable-norm scenario, identity depends on parameterization and exhibits drift, whereas in the constant-norm scenario closure and identity are preserved. This contrast reflects a genuine structural difference rather than a merely verbal one.

Structural consequence 2 (Explanatory unification): The framework provides a unified ontological interpretation of phenomena that are typically treated as conceptually independent:

- Time dilation (standardly accounted for in geometric terms) [1]
- Rest mass (standardly accounted for in dynamical terms) [25]
- The impossibility of absolute rest in special relativity (standardly accounted for kinematically) [2]

Rather than deriving these phenomena, the framework shows that they admit a common ontological articulation grounded in a single principle: invariance of the realization norm. The unification achieved here is therefore conceptual rather than physical, and it is not trivial.

Structural consequence 3 (Conceptual clarification): The framework resolves the central puzzle articulated in the introduction: how a universal limit can coexist with the possibility of rest. Standard responses either appeal to spacetime geometry or dismiss the problem as merely verbal. The present account offers a third option: the universal limit constrains realization rather than motion, and rest corresponds to maximal internal realization rather than to the absence of activity.

Taken together, these consequences indicate that the framework has substantive structural content. A purely verbal account would lack the resources required to sustain results of this kind.

9 Quantum Outlook (Sketch)

The present framework is formulated prior to specific physical theories and therefore does not model quantum dynamics. Nevertheless, it suggests a natural interpretive interface. Quantum superposition can be read as non-classical structure in the space of distinguishability configurations, where realization does not select a single classical individuation pattern but maintains multiple admissible non-coincident orientations under a shared invariant constraint. Entanglement is then interpretable as jointly realized distinguishability that does not factor into independent subsystem cycles, i.e. as closure and comparability conditions that apply to composite realization patterns rather than to subsystems alone.

Measurement, on this sketch, corresponds to a stabilization (effective closure) that yields re-identifiable patterns relative to a macroscopic comparability regime, not to a fundamental "collapse postulate" at the ontological level. This outlook does not solve the measurement problem; it proposes a structural vocabulary in which quantum-to-classical stabilization can be described as the emergence of stable closure and interobjective comparability under the same invariant-norm requirement argued for in Sections 4–6.

10 Conclusion

This paper has argued that the existence of a universal constant traditionally associated with a speed limit should not be understood as a contingent physical postulate. Instead, it reflects a necessary invariant of realization. By analyzing the conditions under which distinguishability can be stably realized, compared, and closed into objects, the paper has shown that a universal norm of realized transfer is required for any coherent ontology of processes, objects, and temporal order.

On this account, realization is ontologically primary. Space, time, motion, and fields are not fundamental constituents of reality, but derived structures that emerge from different orientations and effective descriptions of realization. Motion is reinterpreted as redistribution of realization, rest as maximal internal realization, time as a count of projected transfer, and gradients and fields as stabilized higher-level patterns.

Crucially, this framework avoids ontological inflation. It introduces no new substances, forces, or primitive geometrical structures. Nor does it aim to revise or replace established physical theories. Its contribution is instead to clarify the conditions of possibility under which such theories can meaningfully describe stable objects, interobjective comparison, and temporal structure.

By relocating the universal constant from the level of kinematics to that of ontology, the framework offers a unified and parsimonious account of realization—one in which invariance, rather than dynamics, plays the foundational role.

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Authors' Contributions

Maksym Altunin is the sole author of this work and is responsible for the conceptualization, methodology, formal analysis, writing of the original draft, and all subsequent revisions. The author approves the final version of the manuscript.

Data Availability

This work is purely theoretical and conceptual. No datasets were generated or analyzed, and no data are associated with this article.

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