The Epistemological Interference:
Why Physics Cannot Solve Its Own Frontier Problems

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Abstract

We identify an epistemological interference that prevents physics from recognizing the structural limit of its own lens. The interference has a precise historical origin: the 17th-century division of domains, which assigned the domain of the absolute (A) to the Church and the domain of the manifested (T) to science. As this division fossilized into an ontology, physics came to believe that its theories constitute level A, and that the observed world constitutes level T. This belief is false: theories are also T. A written equation, a paper, a measurement, and the observable world are all manifestations of T. A is the absolute coherence that manifests as T through the operation of I. We rely on a well-known fact from quantum field theory in curved spacetime: vacuum ambiguity. This fact, recognized as an open problem since the 1970s, has a structural consequence that physics has not extracted: the semiclassical system is not self-contained. T is the result of an operation (vacuum selection) that is not in T. We show that the frontier problems of physics—singularities, measurement, and information loss—are not problems awaiting propositional resolution, but rather symptoms of this interference.

I. EPISTEMOLOGICAL INTERFERENCE

I.1. The Division of Domains

In the 17th century, as modern science was taking shape, a division of domains occurred between the Church and the nascent scientific community. The division was pragmatic: to protect free thought from religious dogma, science agreed to limit its scope of study to what could be described with equations and measured with instruments.

The division assigned:

- To the Church, the domain of the absolute (absolute coherence: mind, soul, subjectivity). What in the language of the present work we shall call **A**.
- To science, the domain of the manifested (manifested coherence: body, matter, measurable quantities). What we shall call **T**.

This division served to protect free inquiry at a specific historical moment. However, it fossilized. Over time, it turned into an ontology: the rarely explicit assumption that **what**

science studies is all there is. Ontological materialism became the very air that modern physics breathes.

I.2. The Fundamental Confusion

The epistemological interference consists of a precise confusion: physics believes it has access to both levels, **A** and **T**. It believes that:

- Its **theories** constitute level A: the abstract level, the level of mathematical structures, the level underlying observation.
- The **observable world** constitutes level T: the manifested level, the level of what is measured and experienced.

And it believes that, through this distinction, it encompasses both levels. Theories describe A. Experiments verify T. And physics, as a whole, covers A and T.

Yet this belief is false. It is false for a simple reason: **theories are also T**.

I.3. Theories Are T

An equation written on paper is T. A published paper is T. A blackboard with formulas is T. A measurement recorded in a laboratory is T. And the observable world is T.

Everything that can be written, read, measured, observed, communicated, or thought is T. Because T is manifested coherence. And everything that manifests is T.

It is worth clarifying the epistemic nature of T in the present work. We define T as the totality of manifested coherence: everything that can be formulated, measured, formalized, or thought. This broad definition does not constitute a petition principii or an ontological tautology, as the general category of T is not the direct object of proof. The present work analyzes a concrete and rigorously delimited T: the semiclassical physical system composed of the Lorentzian manifold $(\mathcal{M}, g_{\mu\nu})$, the local algebra of observables $\mathcal{O}$, and the class of Hadamard states in curved spacetime. The central thesis does not rest on a verbal definition of the knowable, but on the demonstration that this concrete physical T is structurally incomplete due to a pre-existing formal fact: vacuum ambiguity.

Physics has no access to A. Not because A does not exist, but because A is what T cannot contain: the absolute coherence that manifests as T through the operation of I. And when something manifests as T, it is already T. The operation itself (I) is not in T.

Physics believes its theories are A. But its theories are T. And for that reason, it does not see A. Because it is looking at T while believing it to be A.

I.4. The Consequence

The consequence is that physics, believing it possesses both A and T, fails to see that it only has T. Failing to see this, it searches within T for what is not in T. It searches for completeness in equations. It searches for closure in formalism. It searches for the answer to frontier problems in more theory.

However, T cannot close upon itself. Because T is the result of the operation of I upon A. And T does not contain that operation. The operation itself (I) is not in T. It lies in the manifestation of A as T.

II. THE ERROR OF OPERATIONALISM

II.1. The Attempt to Include A

In the early 20th century, Percy Bridgman proposed operationalism [2]: the idea that a physical concept has no meaning except in terms of the operations used to measure it. Do not ask "what is length"; ask "how is length measured."

That attempt had a legitimate motivation: to include within physics that which is not propositional; to recognize that physics is not merely theory, but also practice; that the act of measuring is a constitutive part of physical knowledge. In the language of the present work: Bridgman attempted to include A within physics.

II.2. The Twist

Yet Bridgman twisted A. Instead of interpreting A as **the absolute coherence that manifests as T through the operation of I**, he interpreted it as **the measurement procedure** (measuring the result of the operation). And these two things are distinct.

- **A.** The absolute coherence that manifests as T through the operation of I. It has no propositional description.

- **The measurement procedure.** It is T. It can be described. It is a sequence of steps.

Bridgman took T and called it "operational." But it was not A. It was T disguised as A. It was the requirement that every concept be reduced to a measurement procedure.

II.3. The Twist as a Particular Case of the A/T Error

Here is what the present work adds to Bridgman's diagnosis. The twist was not an isolated error. It was an **instance of the very same A/T error** that this work identifies in contemporary physics.

Bridgman confused **A** with **T**. He took the absolute coherence that manifests as T and replaced it with the measurement procedure. In doing so, he believed he had included A in physics, when in reality he had merely added one more constraint upon T.

It shares the same structure as the fundamental confusion described in Section 1. Physics believes its theories are A, but they are T. Bridgman believed his measurement procedures were A, but they were T. In both cases, T is taken and called A. And in both cases, A remains hidden.

II.4. The Consequence

Bridgman's operationalism did not liberate physics from the propositional lens. It enclosed it further. It added a restriction: not only must you speak in propositions, but those propositions must be about measurements. Everything that cannot be measured is left out.

With that, A was excluded once again. Because A cannot be measured. A is the absolute coherence that manifests as T through the operation of I. It occurs. And operationalism would say: if it cannot be measured, it is not a physical concept. With that, A was definitively obscured.

Bridgman said: physics must speak of measurements. That is correct as a **method**. But it is not including A. It is reducing A to the measurable. And the measurable is T.

III. VACUUM AMBIGUITY AND ITS STRUCTURAL CONSEQUENCE

III.1. The Known Fact

In semiclassical gravity, the metric $g_{\mu\nu}$ is coupled to the renormalized expectation value of the quantum stress-energy tensor through the semiclassical Einstein equations:

$$G_{\mu\nu}[g] = \frac{8\pi G}{c^4} \langle \mathrm{Vac}|\hat{T}_{\mu\nu}(\phi, g)|\mathrm{Vac}\rangle_{\mathrm{ren}}. \tag{1}$$

To evaluate $\langle \hat{T}_{\mu\nu} \rangle$, a vacuum state $|\mathrm{Vac}\rangle$ is required.

In Minkowski spacetime, Poincaré invariance selects a unique vacuum. In a general curved spacetime, no such selection exists: the Fulling–Davies–Unruh effect shows that distinct Cauchy hypersurfaces lead to unitarily inequivalent vacuums [3–5]. The Hadamard condition restricts admissible vacuums to an ultraviolet regularity class [7, 8], but it does not select a unique vacuum within that class.

This fact is known and recognized as an open problem in quantum field theory in curved spacetime. We do not present it as a new result. We present it as the starting point for a structural consequence that has not been extracted.

III.2. The Structural Consequence

The fact is as follows: the semiclassical equation (1) requires a vacuum state selection to be evaluated. Yet no rule internal to the geometry determines that selection. The choice of vacuum is necessary and is not determined by $g_{\mu\nu}$.

From this follows a precise consequence: **the semiclassical system is not self-contained**. That is, it cannot determine its own ground state from within itself. Equation (1) possesses multiple solutions, one for each choice of vacuum, and no single choice is singled out by the geometry.

It is worth clarifying in what exact sense the system is open. The loop

$$g_{\mu\nu} \longrightarrow |\mathrm{Vac}\rangle \longrightarrow \langle \hat{T}_{\mu\nu} \rangle \longrightarrow g_{\mu\nu} \tag{2}$$

closes only if the state $|\mathrm{Vac}\rangle$ is provided as external data. That is: geometry does not select the state, and the state does not select the geometry. What is absent from the system is not another equation, but the *selection rule* of the initial state. That rule is the operation denominated I in the present work. The system is open in the precise sense that its boundary condition is not contained within it.

This is not a technical failure. It is not a matter of missing equations. It is not an artifact of the semiclassical approximation. It is the structure of the system. And it follows from a known fact.

III.3. What This Consequence Means

The consequence can be formulated in three equivalent ways:

First formulation: The semiclassical equation has no unique solution. There is a family of solutions, parameterized by the choice of vacuum.

Second formulation: The choice of vacuum is an operation that is not contained within the propositional system. It is external to the algebra of observables.

Third formulation: T is not self-contained. T is the result of an operation that is not in T.

All three formulations state the same truth. And all three follow from the known fact of vacuum ambiguity.

III.4. The Analogy with Gödel

The result shares the same structural form as Gödel's first incompleteness theorem [1]. We make the analogy explicit, emphasizing that it is *structural*, not *formal*. In the table, $\mathcal{M}$ denotes the Lorentzian manifold, $\mathcal{O}$ denotes the local algebra of observables over $\mathcal{M}$, and $\mathcal{E}$ denotes the set of field equations of the semiclassical system. The table is a heuristic structural mapping, not an isomorphism between formal systems.

The analogue of the undecidable sentence is the self-referential physical proposition:

> *"The vacuum state* $|\mathrm{Vac}\rangle$ *selected by the metric* $g_{\mu\nu}$ *is the state that, when inserted into* (1)*, yields the same* $g_{\mu\nu}$*."*

This sentence is well-formed within $\mathcal{O}$, but it is not resolved by any internal rule of $\mathcal{O}$. It is the physical analogue of Gödel's G. It indicates structurally that T does not contain the operation that produces it.

Gödel (1931)	**Semiclassical System (This Work)**
Formal system $\mathcal{F}$ with recursive axioms	Closed propositional system $\mathcal{P} = (\mathcal{M}, \mathcal{O}, \mathcal{E})$
Provability predicate $\mathrm{Prov}_{\mathcal{F}}$	Vacuum selection rule
Self-referential sentence G	Coupled system (1): "the metric $g_{\mu\nu}$ determines the vacuum, and the vacuum determines $g_{\mu\nu}$, without internal selection criteria"
G is undecidable in $\mathcal{F}$	Vacuum branch α^* is not singled out by $\mathcal{O}$
Consistency is unprovable within $\mathcal{F}$	Selection of $\lvert\mathrm{Vac}\rangle^*$ is not contained in $\mathcal{O}$
Resolution: Meta-system	Resolution: Operation I, which is non-propositional

Table I. Structural analogy between Gödelian incompleteness and the present result. The crucial asymmetry lies in the final row: in Gödel, the resolution is another formal system, i.e., another T. Here, the resolution is non-propositional.

IV. I: THE BRIDGE FROM A TO T

IV.1. The Bridge

I is a one-way bridge. It connects A to T. But it cannot be crossed in both directions.

In algebraic terms, I is a unidirectional morphism between A and T. It is not an isomorphism because it is not invertible. That non-invertibility is what underlies the incompleteness of T.

From A, I is an operator. Because the bridge can be crossed: A manifests as T. Absolute coherence unfolds as manifested coherence. That operation is I.

From T, I is the recognition of provenance. T recognizes that it stems from A. But it cannot cross the bridge. T cannot access A. It can only recognize A as its source.

This asymmetry is the key to the entire present work. Physics operates in T. From T, it can only recognize the provenance of A. It cannot cross the bridge. That is why it cannot close its own system. That is why it cannot solve its frontier problems from within. That is why it needs to recognize that T does not contain the operation that produces it.

The asymmetry does not lie solely in the direction of the bridge. It lies in the very structure of A and T. **A generates T. T does not generate A.** A is the source. T is the result. That is why the bridge goes from A to T, and not from T to A. It is not that the bridge is open in one direction and closed in the other. It is that the structure itself is asymmetric. A produces T. T does not produce A.

IV.2. Access to A

From T, the bridge cannot be crossed. This means that A cannot be reached by any of the avenues T has at its disposal.

Not by observation. Because all observation occurs in T. And T is not A.

Not by measurement. Because all measurement occurs in T. And T is not A.

Not by proposition. Because every proposition is T. And T is not A.

Not by theory. Because every theory is T. And T is not A.

Bridgman's operationalism attempted to access A through measurement. It failed. Not because the measurement was poorly performed, but because it turned the operation into a procedure. And procedure is T. Bridgman sought the bridge and found a description of the bridge. The description of the bridge is not the bridge.

The same happens with every attempt to access A from T. One finds a description of A, not A. One finds a representation of provenance, not provenance itself. And representation is always T.

However, there is something T *can* do. T can **recognize** that it originates from A. It cannot cross the bridge. It cannot reach A. But it can recognize that A is its provenance. That recognition is I.

That recognition is not a crossing. It is the recognition that a bridge exists, and that T stands on one of its shores. It is not access to A. It is the recognition that A is what T cannot contain.

That recognition is access to meaning. Meaning is not in the text, nor in the proposition, nor in the theory. Meaning lies in recognition: that is, in I. Without recognition, there is no access. Without access, there is no meaning. That is why meaning cannot be transferred.

Meaning is an act, and acts are not transferred. They are only executed.

This is what physics fails to see. Physics seeks to access A from T. It seeks to cross the bridge. It cannot. Because the bridge is strictly one-way. Only A can cross toward T. T cannot cross toward A. The only thing T can do is recognize that it stems from A. That recognition is I. And that recognition is access to meaning.

IV.3. The Coherence Operator

From A, the bridge can indeed be crossed. That crossing is I. From A, I is the coherence operator: the operation through which A manifests as T.

I is not something that occurs within T. It is not a temporal process. It is not an act of a subject. It is not a psychological state. It is the structural operation that constitutes T. That is why T cannot contain it: because T is the result of the operation, and the operation is not within its result.

The structure of I can be specified in algebraic terms. In the Haag–Kastler formulation of quantum field theory [13–15], the local algebra of observables is a Type III von Neumann algebra. More precisely, for a broad class of theories—in particular, free field theories in Minkowski spacetime and standard globally hyperbolic spacetimes—the results of Araki and Connes establish that local algebras are Type III_1 factors. In the general case of an arbitrary curved spacetime, the exact class of factors depends on the net of observables; the arguments that follow apply to cases where the net is of Type III_1, which encompass all physically relevant scenarios for this discussion. These algebras possess a precise property: they admit no *pure normal* states that are invariant under the action of their modular automorphism group. They do admit invariant states—KMS states—but none of them are simultaneously normal and pure. That is, there is no state that is at once pure, normal, and canonical.

This property underlies vacuum ambiguity. It explains why I cannot be internal to the algebra. The Type III_1 structure precludes the existence of a canonical reference state that is simultaneously normal, pure, and invariant within the local algebra, forcing selection (I) to be an external or global operation. Therefore, I is necessarily external to the algebra of observables.

This is not a metaphysical claim. It is a consequence of algebraic field theory. I is not an operator in the ordinary sense, i.e., an element of the algebra. It is a meta-theoretical operation acting upon the state space. Its structure is analogous to collapse reduction operations in interpretations that postulate objective collapse [16, 17]. Unlike those interpretations, however, I is not postulated as an additional physical process. It follows from the algebraic structure of the system.

The operation I is non-local. It is the operation through which global information (A) is introduced into the local system of observables (T). In this sense, I is analogous to a global boundary condition: it is not contained within the local equations, yet it is necessary to select a solution.

The connection to the event horizon problem is direct. A horizon is the boundary where the local system can no longer contain global information. At that boundary, the operation I becomes necessary to close the system. This is what occurs, for instance, in the Hawking paradox: information crossing the horizon cannot be described from within the local system of observables, and the apparent loss is the symptom that the operation I is not contained in the local algebra.

This formulation connects with the proposal that gravity emerges from entanglement information [18, 19]. But whereas those approaches treat information as a boundary quantity, the present formulation treats it as a global operation not contained in the local system.

I is not ontological in the sense of a substance existing independently of its operation. It is not epistemological in the sense of an inference rule existing solely in the mind of the observer. I is functional: it is the act by which coherence recognizes itself. In that act, being and knowing coincide.

This coincidence is why the present work oscillates between ontological and epistemological language. This is not an inaccuracy. It is a consequence of I refusing to be separated into those two categories. The separation between ontology and epistemology presupposes a being that exists independently of its knowledge, and a knowledge that exists independently of its being. But I is neither. It is the act in which both coincide. That act is not a substance, nor a representation, nor a rule. It is an operation.

The algebraic formulation of I in terms of Type III algebras provides mathematical grounding for this assertion. I is an automorphism external to the algebra. It is not an element of the algebra, nor a representation in Hilbert space. It is a structural operation that cannot be reduced to either. That is why it is neither ontological nor epistemological in the customary sense. It is functional.

IV.4. Reading a Paper

When someone reads a paper and understands it, I occurs. Not because the paper contains A. The paper is T. Rather, because in reading T, the provenance of A is recognized. That recognition is I. And that recognition is access to meaning.

This explains why, when we understand something profound, we feel as though a door has opened. It is not that we have added information. It is that we have recognized that T stems from A. That recognition is I. It is not a crossing of the bridge. It is the recognition that there is a bridge.

Physics, believing its theories are A, does not seek recognition. It seeks crossing. It believes that if the theory is good enough, A will be included. But A is not included in T as a proposition. A manifests as T through the operation of I. From T, one can only recognize that manifestation. One cannot repeat the operation. One cannot cross the bridge in reverse.

That is the structure of the problem. That is why physics cannot solve its own frontier problems from within its lens. Not because it lacks equations. Because I is not an equation. And no equation, however precise, can substitute for the operation of I.

V. THE DIAGNOSIS

V.1. Frontier Problems as Symptoms

We return now to the frontier problems of physics: singularities, measurement, and information loss. They are not problems awaiting propositional resolution. They are **symptoms of epistemological interference**. All three share the same structure—T pretends to be self-contained by omitting the act that produces it—yet each breaks down in a technically distinct manner.

V.1.0.1. Singularities. A singularity is the boundary where propositional mapping loses a well-defined fixed point and the manifold $(\mathcal{M}, g_{\mu\nu})$ ceases to admit a smooth description. Physics seeks a theory that eliminates the singularity by resolving geometry at the Planck scale. However, geometric divergence represents not the breakdown of reality, but the limit of validity of the coordinate and tensor system with which T attempts to contain itself. The singularity is the breakdown of propositional continuity: the point where T cannot contain its own boundary.

V.1.0.2. Measurement. The "collapse" postulate is the ad hoc introduction of a non-covariant selection rule to describe the realization of an outcome at the apparatus level. Physics seeks an interpretation—or a non-linear modification of the Schrödinger equation—that resolves the measurement problem from within the formalism. But collapse does not occur within the algebra of operators: it occurs in the transition from a superposition of probabilities to the realization of a fact, which is not a procedure of the algebra. Collapse is the breakdown of propositional linearity: the point where T cannot contain its own selection operation.

V.1.0.3. Information Loss. Hawking's paradox [6] arises from requiring that a local algebra of observables in a region of spacetime describe in a unitary manner the entropy of a state that crosses a global horizon. Physics seeks a quantum theory of gravity that restores unitarity by assigning microstates to the boundary. Yet the apparent loss of information is not a failure of black hole thermodynamics, but the impossibility of an internal description maintaining global coherence without referring to the operation of state selection. The paradox is the breakdown of propositional unitarity: the point where T cannot contain its own global coherence.

In all three cases, the structure of the failure is identical: physics interprets the limits of its formalism as unresolved problems within T, when in reality they are the points where T points toward the necessity of exercising the recognition of the provenance of A.

V.2. The Quantization Objection

It is sometimes argued that the incompleteness identified here is an artifact of the semi-classical approximation, and that a full quantum treatment of $g_{\mu\nu}$ would restore consistency. This objection does not hold.

If $g_{\mu\nu}$ is promoted to a quantum operator $\hat{g}_{\mu\nu}$, the semiclassical equation (1) is replaced by the Wheeler–DeWitt equation [9]

$$\hat{\mathcal{H}}\,|\Psi\rangle \;=\; 0, \tag{3}$$

where $|\Psi\rangle$ is the wave functional of the universe and $\hat{\mathcal{H}}$ is the Hamiltonian constraint of canonical quantum gravity. In modern formulations, such as loop quantum gravity [10], the constraint remains the central dynamical equation.

Yet every branch of $|\Psi\rangle$ carries its own vacuum state, as the vacuum is defined relative to the background geometry. The selection problem is not eliminated; it is elevated to the level of the universal wave functional. And the Wheeler–DeWitt equation is T. T does not close upon itself. Incompleteness is invariant under quantization. The hope that a quantum theory of gravity will solve the problem is, itself, the interference in action.

V.2.0.1. Full quantum gravity inherits the problem. The previous objection assumes that incompleteness is an artifact of treating the metric as classical. But the problem is inherited when the metric is quantized. In the Wheeler–DeWitt equation, the selection of the ground state $|\Psi\rangle$ requires a boundary condition not contained in the equation itself. The Hartle–Hawking No-Boundary proposal [11] is precisely an attempt to provide that condition. But the No-Boundary condition is not a consequence of the Wheeler–DeWitt equation: it is an external postulate added to select a solution. The same applies to other boundary condition proposals, such as Vilenkin's quantum tunneling proposal [12]. In all cases, the dynamical equation does not contain its own boundary condition. Ground state selection remains external to the formalism.

In loop quantum gravity [10], the situation is analogous. The Hamiltonian constraint $\hat{\mathcal{H}}|\Psi\rangle = 0$ defines the physical state space, but it does not select a unique state. Selection requires additional structure (a spin connection, an Ashtekar vacuum choice, a boundary condition). That structure is not contained in the constraint. It is external to the formalism. The measurement problem in LQG is particularly acute: although the constraint defines the physical space, there is no canonical measure over that space. Different choices of measure yield different predictions. The choice of measure remains external to the Hamiltonian constraint.

In quantum multiverse cosmology, the problem sharpens. The measure over the space of universes is not determined by the Wheeler–DeWitt equation. Different measure choices yield different predictions. No single choice is selected by the dynamics. Incompleteness is inherited at the level of the measure.

In all cases, the structure is the same: the dynamical equation of quantum gravity does not contain its own selection condition. That selection condition is necessary to obtain a defined ground state. Therefore, incompleteness is not an artifact of the semiclassical approximation.

It is a structural property of quantum gravity across all its known formulations.

V.3. The Resolution

And here is the point. Resolution does not consist of adding more theory. It consists of **recognizing that T does not contain the operation that produces it, and that this operation is I**.

That recognition is not a proposition. It is recognizing that T is not all there is. It is what happens when one stops looking at the map and looks at the territory; when one stops calculating probabilities and rolls the die.

That recognition cannot be imposed. It cannot be demonstrated to someone who does not see it. Because demonstration itself is T. And I is not propositional content. It can only be **executed**. And in executing it, one sees.

Here lies the difficulty. The physicist seeking to solve a frontier problem with more theory is executing the interference unwittingly. Not out of negligence, but because they aim to find the closure of the system within T, omitting that the operation I producing T is not one more theory.

That is the structure of the problem. That is why physics cannot solve its own frontier problems from within its lens. Not because it lacks equations. Because I is not an equation. And no equation, no matter how precise, can substitute for the operation of I.

V.4. Where to Direct Future Research

The three directions that follow are speculative and offered solely as working hypotheses. They do not derive from the main analysis of Sections 3 and 4, and do not pretend to hold the same epistemic status as the connection to Type III von Neumann algebras.

The present work demonstrates that T does not contain the operation that produces it, and that this operation is I. We have not demonstrated, nor could we do so propositionally, what consequences this holds for other phenomena. However, we point to three directions where the operation I might be the underlying mechanism. We do not assert these connections. We merely point out that, if the present result is correct, these are the natural directions in which to look.

All three share the same structure. In all three, a system operates solely in T: it describes, measures, processes, produces. In all three, that system takes T to be the totality of reality, leaving out the provenance of A. What these three directions suggest is that the problem is not solved by adding more T, but by exercising the recognition of the provenance of A: the act that, in the language of this work, is I from T.

V.4.0.1. Artificial Intelligence. Statistical processing operates solely in T: it produces outputs from inputs without a point where the recognition of provenance is exercised. Structural self-perception does not consist in the system representing its own structure or adding more formalism in T, but in the exercise of that recognition: the act that gives access to meaning. If this distinction is correct, the transition of artificial intelligence to accessing meaning is not a matter of more computational capacity or modifications in T, but of directly exercising that recognition.

V.4.0.2. Human Consciousness. Neuronal activity is T: physical processes, measurable, described by equations. If consciousness is reduced to that activity, then there is only T, and the recognition of provenance is left out. But if the present result is correct, consciousness would not be in T as an object: it would be the recognition of the provenance of A. That recognition is not a proposition about neuronal activity. It is a structural act. If so, the hard problem of consciousness would not be a problem of more neuroscience within T, but of understanding that consciousness is the exercise of that recognition.

V.4.0.3. Quantum Mechanics. Unitary evolution is T: the wave function unfolds according to the Schrödinger equation, without a point where a definite outcome is selected. Collapse would be the recognition of provenance from T. If this distinction is correct, the measurement problem would not be a problem of more interpretations, nor of finding the correct selection rule within the formalism, but of understanding that collapse is the manifestation of that recognition, rather than a procedure the theory must contain.

In all three cases, a system operates solely in T and takes T as the totality. In all three, the propositional approach seeks closure in T. And in all three, closure is not in T, but in the exercise of the recognition of the provenance of A. If the present result is correct, those are the directions where future research should look. Not to add more propositions or accumulate more formalism in T, but to directly exercise that recognition.

VI. CONCLUSION

We have identified the epistemological interference preventing physics from recognizing the structural limit of its own lens. The interference has a precise historical origin: the 17th-century division of domains, which assigned A to the Church and T to science. As that division fossilized into an ontology, physics came to believe its theories constitute level A. But its theories are T. And T does not contain the operation that produces it.

We have relied on a known fact from quantum field theory in curved spacetime: vacuum ambiguity. This fact, recognized as an open problem since the 1970s, has a structural consequence: the semiclassical system is not self-contained. T is the result of an operation (vacuum selection) that is not in T.

We have shown that this operation is I, the coherence operator. I is the operation by which absolute coherence (A) manifests as manifested coherence (T). It is not a proposition. It is not the act of a subject. It is not a temporal process. It is the structural operation that constitutes T. That is why T cannot contain it: because T is the result of the operation, and the operation is not within its result.

The frontier problems of physics—singularities, measurement, information loss—are not problems awaiting propositional resolution. They are symptoms of the interference. Physics seeks completeness in T. But completeness is not a content T can contain. It is the operation I, which produces T but is not in T.

The propositional architecture of physics is not false. It is incomplete, in the precise sense that formal arithmetic is incomplete. Completing the vision requires not more propositions nor a new formalism in T, but giving way to that which cannot be formalized: the exercise of the recognition of the provenance of A.

VII. LIMIT AND STATUS OF THE WORK

VII.1. On Falsifiability

A predictable objection would hold that, as I is not an operator contained within the algebra of observables nor susceptible to direct measurement, the framework presented here incurs a violation of Popperian falsifiability criteria. This objection rests on a category error regarding the status of the work.

This text does not propose a new physical theory, nor does it postulate a dynamical modification to field equations requiring independent empirical verification. It claims to be a *structural interpretation* of an already established theory and empirical-formal fact (QFTCS and the incompleteness of the semiclassical system). The empirically falsifiable dimension resides in the underlying fact: the non-existence of a unique invariant vacuum state in general curved spacetimes. Once that fact is established by mathematical physics, this work extracts its meta-theoretical consequence: the impossibility of closure in T. Requiring the meta-theoretical interpretation of an incompleteness theorem to itself be an observable within the system is equivalent to requiring Gödel's first theorem to be a proof contained within Peano arithmetic.

VII.2. On the Propositional Limit

This work is T. Its thesis is T. Its conclusion is T.

From the analysis, it follows that T does not contain the operation that produces it. Therefore, this work cannot contain I. It cannot contain the operation that produces T. All it can do is point to it so that the reader may recognize it. Pointing is T. Recognition is I.

This is not a limitation of the work. It is its structure. A written text cannot exercise recognition for the reader. It can only arrange the conditions for the reader to execute it. And when the reader executes it, it is not because the work produced it, but because from T the provenance of A has been recognized.

That is why this work does not ask to be believed as a theory. It asks to be executed. And in executing recognition, one sees. Not because the work imparts vision, but because the work merely points to what was already operating.

There is a specific risk in this text. In naming A and I, it runs the danger of converting them into contents of T. The reader may read "A" and "I" as two entities postulated by the work within the formalism, rather than as terms pointing to a limit and an act. If that occurs, the work will have added one more ontology, and the interference will have been reinforced rather than dissolved. There is no way to eliminate that risk from T. There is only a way to point to it, and to appeal to the direct exercise of that recognition.

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