Invariant Temporal Ordering Framework (ITOF) V15: Physical Realization and Residual Reassignment Under Invariant Ordered Succession

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Abstract

The Invariant Temporal Ordering Framework (ITOF) defines time as invariant ordered succession rather than measurable duration, accumulated change, dynamical flow, physical substance, or deformable temporal entity. Its foundational temporal structure is represented by

$$T_{\text{ITOF}} = (S, \prec),$$

where S denotes the set of physically admissible states and $\prec$ denotes invariant ordered succession. This ordering relation is not itself a measurable physical observable, a physical influence, a causal agency, or a dynamical input to physical evolution.

Observable physical evolution is represented separately through measurable mappings

$$X : S \to \mathbb{R}, \qquad \Delta X_{ij} = X(S_j) - X(S_i),$$

so that

$$S_i \prec S_j \neq \Delta X_{ij}.$$

The framework therefore separates temporal ontology from measurable physical realization. Quantities such as ΔX, $R_{A|B}$, and $\delta_{A|B}$ belong to the observable physical domain, while

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

The present formulation develops this distinction into a physical-realization architecture. Physical influences possess influence-character:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which an influence acts. Time, by contrast, has ordering structure rather than influence-character. In other words, time does not carry the constitutive properties by which physical influences act:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Accordingly, measured physical evolution is not represented as an effect of time itself. It is represented as physical realization under invariant ordered succession:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

where Θ_A denotes the physical structure of system A as response organization, and $\mathcal{E}_A$ denotes the aggregated influence profile realized upon that system.

Comparative residuals are therefore assigned to physical realization rather than temporal deformation:

$$\delta_{A|B}\Big|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

with the central closure

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

This formulation is not a denial of measured relativistic asymmetries; it is a reassignment of their ontological interpretation. Measured asymmetry is preserved as physical data, while the necessity of interpreting it as deformation of time is rejected. The framework therefore proposes a foundational alternative to relativistic temporal interpretation by relocating measured asymmetry from time itself to structure-dependent physical realization under invariant ordered succession.

Contents

1. Introduction

The interpretation of time in physics is inseparable from the interpretation of measurement. Experimental practice does not directly access time as a physical substance, field, force, energetic carrier, or independently measurable dynamical entity. It accesses physical processes: oscillations, transitions, frequency shifts, propagation relations, particle processes, chemical evolution, pressure-sensitive behavior, resonant response, and measurable differences between physical states.

The Invariant Temporal Ordering Framework (ITOF) begins from this distinction. Time is defined as invariant ordered succession:

$$T_{\mathrm{ITOF}} = (S, \prec),$$

where S denotes the set of physically admissible states and $\prec$ denotes invariant ordered succession among those states. This definition does not identify time with measurable duration, accumulated change, physical flow, causal agency, or deformable temporal substance. It identifies time with the invariant ordering structure within which physical states become distinguishable.

Observable physical evolution is represented separately through measurable mappings:

$$X : S \to \mathbb{R},$$

with measurable differences between ordered states represented by:

$$\Delta X_{ij} = X(S_j) - X(S_i).$$

Accordingly:

$$S_i \prec S_j \neq \Delta X_{ij}.$$

The relation $S_i \prec S_j$ expresses ordered succession. The quantity ΔX_{ij} expresses measurable physical difference. This distinction is the starting point of the framework. Ordered succession is temporal ontology; measurable difference belongs to physical realization.

The central issue addressed in this formulation is not whether physical systems exhibit measurable asymmetry. They do. Clocks, frequencies, signals, particle processes, chemical systems, pressure-sensitive systems, resonant structures, and coupled physical systems may exhibit measurable differences under gravitational, kinematic, thermal, pressure-dependent, electromagnetic, chemical, or interaction-dependent conditions. The central issue is where those measurable differences are assigned.

Within relativistic temporal interpretation, measured asymmetry between systems is commonly assigned to differences in temporal intervals or spacetime-temporal structure:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

ITOF rejects this attribution as a necessary ontological conclusion. It preserves the measured asymmetry as operational physical data, but assigns that asymmetry to structure-dependent physical realization under invariant ordered succession:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

The temporal ontology remains invariant:

$$T_A = T_B = T_{\text{ITOF}}.$$

Therefore:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

This is not a denial of measured relativistic asymmetries. It is a reassignment of their ontological attribution. The measured differences remain physically real; the necessity of interpreting them as deformation of time is rejected.

The present formulation develops this reassignment through a controlled mathematical architecture. Physical influences are represented as possessing influence-character:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which an influence acts. Time does not possess such influence-character:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Thus, measured physical evolution is not represented as:

$$\Delta X_A = F_A(\Theta_A, T_{\text{ITOF}}),$$

but as physical realization under invariant ordering:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

Here, Θ_A denotes the physical structure of system A as response organization, and $\mathcal{E}_A$ denotes the aggregated influence profile realized upon that system. The vertical condition T_{ITOF} does not make time a variable inside the realization function. It states that physical realization is evaluated within invariant ordered succession.

This formulation does not introduce system structure, influence profiles, residuals, coefficients, geometry, or experimental domains as standalone physical discussions. They are introduced only insofar as they serve the temporal claim of ITOF: measured asymmetry belongs to physical realization, not to temporal deformation.

The framework therefore proceeds through the following logical sequence:

$$T_{\mathrm{ITOF}} = (S, \prec),$$

$$T_{\mathrm{ITOF}} \notin \{E_i(\Pi_i)\},$$

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

Operational adequacy does not by itself determine temporal ontology. A measurement structure may be empirically effective while its ontological assignment remains open to foundational analysis. ITOF therefore preserves the operational success of measured relativistic phenomena while rejecting the necessity of assigning those measurements to deformable time.

This interpretive principle may be expressed compactly as:

$$\boxed{\text{operational success} \not\Rightarrow \text{unique temporal ontology}}$$

and more specifically:

$$\boxed{\text{successful relativistic correction} \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

The purpose of the present work is to present a focused, non-defensive formulation of this position. The framework does not claim that every realization coefficient has already been derived from microscopic first principles. It establishes the temporal ontology, the physical-realization assignment, the residual architecture, and the experimental route through which measured asymmetries may be progressively constrained without converting them into temporal deformation.

The central claim is therefore not that measured asymmetries are absent, but that their existence does not determine their temporal ontology. The philosophical position of ITOF is therefore neither a denial of measurement nor a retreat into purely instrumental description. It accepts measured physical asymmetry as real, but separates the reality of the measured phenomenon from the ontological conclusion assigned to it. Measurement establishes that something physical differs; it does not, by that fact alone, establish that time itself has changed.

2. Temporal Ontology and Observable Distinction

The Invariant Temporal Ordering Framework begins from a strict distinction between temporal ontology and observable physical measurement. Time is not defined here as measurable duration, accumulated change, dynamical flow, physical substance, energetic transfer, or a deformable physical entity. It is defined as invariant ordered succession:

$$T_{\mathrm{ITOF}} = (S, \prec),$$

where S denotes the set of physically admissible states and $\prec$ denotes invariant ordered succession among those states. The relation $\prec$ establishes that states may stand in prior–subsequent order. It does not itself represent measurable physical change, dynamical production, rate, duration, or interaction.

The ordered structure may be represented schematically as:

$$S_0 \prec S_1 \prec S_2 \prec S_3 \prec \cdots .$$

This expression should not be read as a numerical time axis carrying measurable temporal magnitude. It represents ordered succession only. The framework therefore separates the existence of ordered distinguishability from the measurable physical content that may differ between ordered states.

Observable physical quantities are represented by mappings from physically admissible states into measurable values:

$$X : S \to \mathbb{R}.$$

For two ordered states S_i and S_j, the measurable physical difference is:

$$\Delta X_{ij} = X(S_j) - X(S_i).$$

The ordering relation and the measurable difference are not identical:

$$S_i \prec S_j \neq \Delta X_{ij}.$$

This relation is foundational. The expression $S_i \prec S_j$ belongs to temporal ordering. The expression ΔX_{ij} belongs to observable physical realization. Ordered succession provides the condition under which states may be distinguished; measurable change expresses the physical difference between those states. This position should not be confused with treating time as a material substance or as a mere linguistic convention. In ITOF, temporal ordering has ontological status as the invariant structure of succession, but it does not have physical-substance status. It is necessary for the ordered distinguishability of physical states, yet it is not itself a measurable physical content among those states.

A measurable difference presupposes distinguishable ordered states:

$$\Delta X_{ij} \Rightarrow S_i \prec S_j.$$

However, ordered succession does not determine a universal magnitude of measurable change:

$$S_i \prec S_j \nRightarrow |\Delta X_{ij}| = \text{constant}.$$

Nor does ordered succession imply that different systems must realize the same measurable evolution between ordered states:

$$S_i^A \prec S_j^A, \quad S_i^B \prec S_j^B \nRightarrow |\Delta X_A| = |\Delta X_B|.$$

Thus, ordered succession is universal at the level of temporal ontology, while measurable realization is physical and system-dependent. The framework may therefore be summarized by the distinction:

$$\text{ordered succession} \neq \text{measurable physical evolution.}$$

Experimental measurement accesses observable physical quantities and comparative physical relations. It does not directly access temporal ontology as a measurable object. Accordingly:

$$\Delta X,\ R_{A|B},\ \delta_{A|B} \in O_{\text{phys}},$$

while:

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

Here O_{phys} denotes the domain of measurable physical observables. Quantities such as ΔX, comparative ratios, and residuals belong to the observable physical domain. By contrast, T_{ITOF} denotes the invariant ordering structure within which such observables become distinguishable.

This distinction is not a secondary interpretive preference. It is the first structural separation required by the framework. If measured quantities belong to O_{phys}, while temporal ordering does not, then a measured physical difference cannot by itself be identified with a measured deformation of temporal ontology.

The first conclusion of the framework is therefore:

$$\boxed{T_{\text{ITOF}} = (S, \prec) \quad \text{and} \quad T_{\text{ITOF}} \notin O_{\text{phys}}.}$$

The second conclusion is:

$$\boxed{S_i \prec S_j \neq \Delta X_{ij}.}$$

The third conclusion is:

$$\boxed{\Delta X,\ R_{A|B},\ \delta_{A|B} \in O_{\text{phys}}, \quad T_{\text{ITOF}} \notin O_{\text{phys}}.}$$

These relations establish the foundation for the rest of the framework. The task of later sections is not to redefine time, but to explain how measurable physical differences, ratios, and residuals arise within invariant ordered succession without assigning those differences to deformation of time itself.

3. Time Has No Physical Agency

The preceding section established that temporal ontology is invariant ordered succession rather than observable physical evolution. The present section develops the second necessary step: ordered succession does not possess physical agency. This point is decisive because a measured physical difference can be assigned to time only if time is first treated as a physical factor capable of acting on systems.

Within ITOF, temporal ontology is represented by

$$T_{\text{ITOF}} = (S, \prec).$$

The ordered relation $(S, \prec)$ establishes succession among physically admissible states. It does not transfer energy, carry momentum, generate coupling, impose a field, produce perturbation, or interact with systems as a physical agent. Therefore:

$$(S, \prec) \not\Rightarrow A_{\text{phys}},$$

where A_{phys} denotes physical agency or interaction capacity. The absence of physical agency does not make temporal ordering irrelevant. It means that the role of time is structural rather than dynamical. Temporal ordering makes succession intelligible; it does not produce the physical differences that appear within succession.

A physical influence must possess properties through which it acts. Such an influence may be represented as

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the influence-character of E_i. These properties may include intensity, direction, frequency, density, pressure, temperature, gravitational field, acceleration, chemical medium, electromagnetic field, propagation mode, interaction type, coupling capacity, or other physical characteristics.

Time in ITOF does not possess such influence-character. It has ordering structure, not physical action-structure. More precisely, time does not carry the constitutive properties by which physical influences act. An ordering relation may distinguish states without physically acting upon them. Therefore:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

This may be stated as the influence-character exclusion principle of the framework:

$$\boxed{T_{\text{ITOF}} \notin \{E_i(\Pi_i)\} \quad \Rightarrow \quad T_{\text{ITOF}} \text{ is not a physical influence.}}$$

The significance of this principle is not merely terminological. It blocks the direct inference from measured physical asymmetry to temporal deformation unless temporal ordering is first shown to possess physical influence-character. A measured difference between systems may require a physical explanation, but that explanation cannot be assigned to time itself unless time is first shown to act as a physical influence.

Accordingly, measured physical evolution is not represented as

$$\Delta X_A = F_A(\Theta_A, T_{\text{ITOF}}).$$

This expression is rejected because it treats time as a physical input to the realization of measurable change. In ITOF, time is the invariant ordering condition within which measurable realization becomes distinguishable; it is not a dynamical factor producing that realization.

The correct form is therefore not a time-driven realization equation, but a physical-realization equation under invariant ordering:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The vertical condition indicates that measurable realization is evaluated within invariant ordered succession. It does not introduce T_{ITOF} as an additional physical variable inside F_A. The distinction is essential:

$$\Delta X_A = F_A(\Theta_A, \mathcal{E}_A, T_{\text{ITOF}})$$

would incorrectly convert temporal ordering into a physical input, while

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A)$$

preserves the proper separation between invariant temporal ontology and physical realization.

This separation also controls the interpretation of residuals. If two systems exhibit different measurable realization, the difference requires analysis of physical realization, not immediate attribution to time:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

The conclusion of this section is therefore:

$$\boxed{(S,\prec) \not\Rightarrow A_{\text{phys}}, \qquad T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.}$$

Time is not a physical influence. It is not a dynamical cause of measured evolution. It is the invariant ordered structure within which physical systems realize measurable change through physical influences and response organization. The next section develops that realization relation directly.

4. Physical Realization Under Invariant Ordering

The preceding section established that time, as invariant ordered succession, has no physical agency and does not possess influence-character. The present section identifies the positive structure that replaces temporal attribution: measurable evolution is physical realization under invariant ordering.

A physical system does not realize measurable change through time as a dynamical input. It realizes measurable change through the relation between its physical response-structure and the physical influences realized upon it. The central realization relation of the framework is therefore:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

Here, ΔX_A denotes the measurable physical evolution of system A. The vertical condition T_{ITOF} indicates that the measurable realization is evaluated within invariant ordered succession. It does not mean that time is an argument of the realization function.

This notation expresses a distinction between condition and cause. Invariant ordered succession is the condition under which measurable realization is ordered and compared; it is not the cause that generates the measured realization. The cause-side of measurable realization belongs to physical structure and influence, not to temporal ordering itself. The symbol Θ_A denotes the physical structure of system A as response organization:

$$\Theta_A \equiv \text{the physical structure of system } A \text{ as response organization.}$$

This definition is important. The internal structure of a system and its response organization are not two separate foundations. The system's internal composition, configuration, interaction accessibility, threshold behavior, nonlinear sensitivity, resonance behavior, and coefficient structure are contained within Θ_A insofar as they determine how the system realizes physical influence. Therefore, the framework does not require a separate foundational symbol for internal structure apart from Θ_A.

Accordingly, the following form is not used as a foundational equation:

$$\Theta_A = \Theta_A(\Sigma_A, I_A, \Lambda_A).$$

Such a decomposition may be used only as a secondary explanatory expansion if a specific domain requires it. At the foundational level, Θ_A already denotes the system's structure as the organization of response.

The symbol $\mathcal{E}_A$ denotes the aggregated influence profile realized upon system A. Physical influences are represented as possessing influence-character:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which the influence acts. In realistic physical conditions, influences may overlap, couple, distribute, and combine before or during their realization within a system. The aggregated influence profile is represented by:

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}\big(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n)\big).$$

The symbol $\mathcal{O}$ denotes ordered extension as an observational domain. It is not a physical influence, not a field, not an interaction source, and not a dynamical cause. Its role is to provide the ordered observational domain within which physical influences can be tracked, compared, and organized across distinguishable succession.

Thus:

$$\mathcal{O} \neq E_i(\Pi_i),$$

and:

$$\mathcal{O} \nRightarrow A_{\text{phys}}.$$

The aggregation law therefore does not turn ordered extension into a physical influence. It only states that physical influences are identified and compared across ordered succession.

The symbol $\mathcal{E}_A$ therefore does not merely list external influences. It denotes the realized influence profile relevant to system A, after physical influences have been constrained, combined, coupled, filtered, or organized within the observational and experimental domain. The realized profile remains physical; it is not temporal ontology and not an additional action of time.

The complete realization relation may be written as:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A\left(\Theta_A, \mathcal{L}_{\mathcal{E}}\big(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n)\big)\right).$$

This relation is not a temporal-deformation equation. It is a physical-realization equation evaluated under invariant temporal ordering. The measurable output ΔX_A belongs to the physical system and its realized influence profile; it does not belong to time as a dynamical producer.

The framework therefore rejects the temporal-input form:

$$\Delta X_A = F_A(\Theta_A, T_{\text{ITOF}}),$$

and also rejects the expanded temporal-input form:

$$\Delta X_A = F_A(\Theta_A, \mathcal{E}_A, T_{\mathrm{ITOF}}).$$

Both forms incorrectly treat time as a physical input to measurable realization. The correct attribution is:

$$\boxed{\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).}$$

This equation expresses the central assignment of the framework. Measurable evolution is generated by the relation between response-structure and realized physical influence, while temporal ontology remains the invariant ordered condition under which that measurable evolution becomes distinguishable.

For two systems A and B, the corresponding realization relations are:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\Delta X_B|_{T_{\mathrm{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B).$$

If the two systems differ in response-structure, realized influence profile, or both, then measurable realization may differ:

$$(\Theta_A, \mathcal{E}_A) \neq (\Theta_B, \mathcal{E}_B) \Rightarrow \Delta X_A \neq \Delta X_B|_{T_{\mathrm{ITOF}}}.$$

This implication does not introduce temporal deformation. It assigns measurable difference to physical realization. Therefore:

$$\Delta X_A \neq \Delta X_B|_{T_{\mathrm{ITOF}}} \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

The conclusion of this section is:

$$\boxed{\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A) \quad \text{and} \quad \Delta X_A \neq F_A(\Theta_A, T_{\mathrm{ITOF}}).}$$

Measured evolution is physical realization under invariant ordered succession. It is not the action of time, not a deformation of time, and not a direct measurement of temporal ontology. The following sections develop how response structures, influence profiles, and residuals are organized without losing this temporal distinction.

5. Influence Domain and Response Domain

The realization equation established in the preceding section separates time from physical realization:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The present section clarifies the two physical domains appearing in this relation. The first is the domain of influence. The second is the domain of response. This distinction is required because measured asymmetry cannot be assigned correctly unless the source of physical action and the structure of physical response are kept conceptually separate from temporal ordering.

Physical influences belong to the domain of action. They are represented by:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which the influence acts. These properties may include intensity, direction, frequency, density, pressure, temperature, gravitational field, acceleration, electromagnetic field, chemical medium, propagation mode, interaction type, or coupling capacity.

Influences are not always realized as isolated independent factors. They may overlap, couple, aggregate, interfere, or form effective influence profiles before or during physical realization. Therefore, the relevant input to a system is not always a single isolated influence, but a realized influence profile:

$$\{E_i(\Pi_i)\} \longrightarrow [\mathcal{E}_r].$$

Here $[\mathcal{E}_r]$ denotes a class of realized influence profiles. It is not a new temporal structure and not a substitute for time. It is a physical classification of how influences are organized or constrained before being realized by a system.

Physical systems belong to the domain of response. A system is represented through its structure as response organization:

$$\Theta_A.$$

When systems are considered at a broader comparative level, a system A may be treated as belonging to a response-structure class:

$$A \in [\Theta_k].$$

This notation does not introduce a separate system-type symbol independent of Θ_A. It means that the system belongs to a general class of response-structure. The internal physical, chemical, biological, material, or organizational details of the class are contained within the class-level response structure and are not separately decomposed at the foundational level.

Thus, the framework distinguishes:

$$\{E_i(\Pi_i)\} \to [\mathcal{E}_r]$$

as the influence-domain classification, and:

$$A \in [\Theta_k]$$

as the response-domain classification.

The measurable realization associated with a response-structure class under an influence-profile class may be expressed schematically as:

$$[\Theta_k] \times [\mathcal{E}_r] \longrightarrow \Delta X_{k,r}|_{T_{\mathrm{ITOF}}} .$$

This relation is not introduced as a standalone theory of physical classification. Its purpose is temporal and interpretive: it explains how measured physical differences can arise from response-domain and influence-domain structure without assigning those differences to deformation of time.

For systems in the same response-structure class under comparable realized influence profiles, measurable realization is expected to be approximately convergent:

$$A, B \in [\Theta_k], \qquad \mathcal{E}_A, \mathcal{E}_B \in [\mathcal{E}_r] \Rightarrow \Delta X_A \approx \Delta X_B|_{T_{\mathrm{ITOF}}} ,$$

within intra-class variation and experimental uncertainty. This relation does not claim perfect identity. It states that comparable response-structure under comparable influence-profile conditions should tend toward comparable measurable realization.

For systems in different response-structure classes under comparable realized influence profiles, measurable realization may be characteristically different:

$$A \in [\Theta_k], \qquad B \in [\Theta_m], \qquad k \neq m, \qquad \mathcal{E}_A, \mathcal{E}_B \in [\mathcal{E}_r].$$

In that case, a residual difference may arise from the difference between response-structure classes:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta([\Theta_k], [\Theta_m]; [\mathcal{E}_r]).$$

If the response-structure class is comparable but the realized influence-profile class differs, then the residual may instead be assigned to the influence-domain difference:

$$A, B \in [\Theta_k], \qquad \mathcal{E}_A \in [\mathcal{E}_r], \qquad \mathcal{E}_B \in [\mathcal{E}_s], \qquad r \neq s,$$

so that:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta([\Theta_k]; [\mathcal{E}_r], [\mathcal{E}_s]).$$

In the general case, both the response-domain class and the influence-domain profile may differ:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta([\Theta_k], [\Theta_m]; [\mathcal{E}_r], [\mathcal{E}_s]).$$

These relations are not temporal-deformation equations. They are classification relations for physical realization under invariant temporal ordering. Their function is to prevent the residual from being assigned directly to time.

The distinction may therefore be summarized as follows:

$$\boxed{\{E_i(\Pi_i)\} \to [\mathcal{E}_r]}$$

$$\boxed{A \in [\Theta_k]}$$

$$\boxed{[\Theta_k] \times [\mathcal{E}_r] \to \Delta X_{k,r}|_{T_{\mathrm{ITOF}}}}$$

The classification symbols $[\Theta_k]$ and $[\mathcal{E}_r]$ should be understood operationally. In natural settings, response-structure classes and influence-profile classes may be identified approximately, allowing approximate convergence or divergence predictions. In controlled experimental settings, the same classes may be constrained more sharply by isolating the relevant observable, response structure, and influence profile. Thus, classification in the framework is not a speculative taxonomy; it is a controlled operational device for assigning residuals to physical realization rather than temporal deformation.

with the interpretive closure:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

The result is a controlled physical classification scheme whose role is not to replace known physics of systems and influences, but to assign measured asymmetry correctly. Physical influences belong to the action domain. Physical systems belong to the response domain. Time belongs to neither as a physical influence. It remains the invariant ordered structure within which the resulting measurable realization becomes distinguishable.

6. Residual Architecture Under Invariant Ordering

The preceding sections established that measurable realization is produced through the relation between response-structure and realized influence profile under invariant ordered succession. The present section develops the comparative structure through which differences between measurable realizations become operationally visible.

For a physical system A, measurable realization is represented by:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

For a second physical system B, the corresponding realization is:

$$\Delta X_B|_{T_{\mathrm{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B).$$

The two systems are evaluated under the same invariant temporal ontology:

$$T_A = T_B = T_{\mathrm{ITOF}}.$$

Thus, any difference between ΔX_A and ΔX_B must first be assigned to physical realization, not to a difference in temporal ontology.

The comparative response ratio is defined as:

$$R_{A|B} = \frac{\Delta X_A}{\Delta X_B}.$$

The corresponding residual deviation is:

$$\delta_{A|B} = R_{A|B} - 1.$$

Substituting the realization equations gives:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A)}{F_B(\Theta_B, \mathcal{E}_B)} - 1.$$

This is the operational residual form of ITOF. It states that comparative asymmetry between systems is a comparative difference between physical realizations under invariant temporal ordering.

The same relation may be written in compressed form:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

This equation does not introduce a new temporal variable. It states that residual divergence may arise from differences in response-structure, differences in realized influence profile, or both:

$$\Theta_A \neq \Theta_B, \qquad \mathcal{E}_A \neq \mathcal{E}_B,$$

or:

$$(\Theta_A, \mathcal{E}_A) \neq (\Theta_B, \mathcal{E}_B).$$

Accordingly:

$$(\Theta_A, \mathcal{E}_A) \neq (\Theta_B, \mathcal{E}_B) \Rightarrow \delta_{A|B} \neq 0\Big|_{T_{\mathrm{ITOF}}},$$

whenever the resulting differential realization exceeds the relevant experimental or operational tolerance.

The central closure is therefore:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

This closure is not an auxiliary statement. It is the interpretive core of the residual architecture. A nonzero residual establishes differential measurable realization. It does not establish deformation of temporal ontology.

The observable status of the residual is also important. The residual belongs to the physical observable domain:

$$\delta_{A|B} \in O_{\text{phys}}.$$

The comparative ratio also belongs to the observable physical domain:

$$R_{A|B} \in O_{\text{phys}}.$$

By contrast:

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

Therefore, a measured residual cannot be identified directly with a measured change in temporal ontology. It is an observable comparison between physical realizations, while temporal ordering remains the invariant condition under which the comparison is made.

The residual architecture also preserves constrained physical regularity. ITOF does not claim that all physical systems realize identical measurable evolution. Nor does it treat physical realization as arbitrary. Instead, physical realization is lawfully constrained by response-structure and realized influence profile.

This may be expressed as:

$$F_A(\Theta_A, \mathcal{E}_A) \sim F_B(\Theta_B, \mathcal{E}_B)|_{T_{\text{ITOF}}},$$

while still allowing:

$$F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B)|_{T_{\text{ITOF}}}.$$

The symbol $\sim$ denotes lawful comparability or constrained structural consistency, not strict numerical identity. Physical realization may be comparable without being identical. This relation prevents two opposite errors. The framework does not claim universal identity of measurable realization across all systems, since such identity would erase observable physical diversity. At the same time, it does not treat realization as unrestricted arbitrariness. Physical realization is interpreted as constrained structural diversity: systems may differ measurably because their response-structures and realized influence profiles differ, while their behavior remains governed by lawful physical organization under invariant ordered succession.

Residual convergence occurs when the relevant response-structures and influence profiles are sufficiently close:

$$\Theta_A \approx \Theta_B, \qquad \mathcal{E}_A \approx \mathcal{E}_B \Rightarrow \delta_{A|B} \to 0\Big|_{T_{\text{ITOF}}}.$$

Residual divergence occurs when the realization conditions differ sufficiently:

$$(\Theta_A, \mathcal{E}_A) \neq (\Theta_B, \mathcal{E}_B) \Rightarrow \delta_{A|B} \neq 0\Big|_{T_{\text{ITOF}}}.$$

Neither convergence nor divergence changes the temporal ontology. A bounded or null residual constrains physical realization; it does not prove absence of ordered succession. A significant residual reveals differential physical realization; it does not prove deformation of time.

The residual structure therefore has the following interpretation:

$$\boxed{\delta_{A|B}\Big|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B)}$$

with:

$$\boxed{\delta_{A|B} \in O_{\text{phys}}, \qquad T_{\text{ITOF}} \notin O_{\text{phys}}.}$$

and:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

The conclusion of this section is direct: residuals are measurable physical-realization differences under invariant temporal ordering. They are not temporal variables, not measurements of temporal deformation, and not evidence by themselves that time has changed. The following section turns this residual architecture into an experimental structure by introducing controlled influence profiles, constrained response classes, and predictive residual comparison.

7. Experimental Architecture Under Invariant Ordering

The residual architecture developed in the preceding section becomes experimentally meaningful only when the systems, influence profiles, observables, and uncertainty bounds are constrained. The purpose of experiment in ITOF is therefore not to measure deformation of temporal ontology. It is to compare measurable physical realization under invariant ordered succession.

The general realization relation for a tested system A is:

$$\Delta X_A^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A^{\text{test}}).$$

For a second tested system B:

$$\Delta X_B^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B^{\text{test}}).$$

The temporal condition is the same in both cases:

$$T_A = T_B = T_{\text{ITOF}}.$$

Thus, the experiment does not compare two different temporal ontologies. It compares two physical realizations under invariant temporal ordering.

A controlled test begins by constraining the influence domain. Physical influences are represented by:

$$E_i = E_i(\Pi_i),$$

and the tested influence profile is represented as:

$$\{E_i(\Pi_i)\}^{\text{test}} \to [\mathcal{E}_r]^{\text{test}}.$$

Here $[\mathcal{E}_r]^{\text{test}}$ denotes a constrained or classified influence-profile class inside the experimental domain. This may involve controlled pressure, temperature, field condition, chemical medium, motion condition, signal condition, or coupled physical influences. These are physical constraints on realization, not temporal variables.

The response domain is constrained by choosing systems or classes of systems:

$$A \in [\Theta_k], \qquad B \in [\Theta_m].$$

The symbols $[\Theta_k]$ and $[\Theta_m]$ denote response-structure classes. They do not introduce a second foundation beyond Θ_A and Θ_B. They are experimental classifications of the physical structures through which systems realize influence profiles.

The tested residual is then:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \frac{\Delta X_A^{\text{test}}}{\Delta X_B^{\text{test}}} - 1.$$

Substituting the realization functions gives:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A^{\text{test}})}{F_B(\Theta_B, \mathcal{E}_B^{\text{test}})} - 1.$$

At the class level, this may be represented as:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

This expression gives the experimental residual architecture of ITOF. It assigns the tested residual to the relation between response-structure classes and tested influence-profile classes. It does not assign the residual to temporal deformation.

Four experimental cases follow from this structure.

First, if the tested systems belong to the same response-structure class and are subjected to comparable tested influence profiles,

$$A, B \in [\Theta_k], \qquad \mathcal{E}_A^{\text{test}}, \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_r]^{\text{test}},$$

then measurable realization is expected to be approximately convergent:

$$\Delta X_A^{\text{test}} \approx \Delta X_B^{\text{test}}\Big|_{T_{\text{ITOF}}},$$

within intra-class variation and experimental uncertainty. The corresponding residual should be bounded:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}}$$

when class-level differences are below experimental sensitivity.

Second, if the tested systems belong to different response-structure classes while the influence profile is held comparable,

$$A \in [\Theta_k], \qquad B \in [\Theta_m], \qquad k \neq m,$$

$$\mathcal{E}_A^{\text{test}}, \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_r]^{\text{test}},$$

then any significant residual is assigned to differential response-structure realization:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}\right).$$

Third, if the tested systems belong to the same response-structure class while the tested influence profiles differ,

$$A, B \in [\Theta_k],$$

$$\mathcal{E}_A^{\text{test}} \in [\mathcal{E}_r]^{\text{test}}, \qquad \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_s]^{\text{test}}, \qquad r \neq s,$$

then the residual is assigned primarily to difference in realized influence profile:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Fourth, if both response-structure class and influence-profile class differ, the residual has the general tested form:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Experimental significance is determined by comparison with uncertainty. A significant residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}}.$$

A bounded or null residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}}.$$

Both outcomes are physically meaningful. A significant residual supports differential physical realization. A bounded or null residual constrains the permissible magnitude of differential realization. Neither outcome implies alteration of temporal ontology.

A null or bounded residual therefore does not return the interpretation to temporal deformation or temporal identity as a measured object. It constrains the physical realization model by limiting the admissible difference between response-structures, influence profiles, coefficients, or classification assumptions within the sensitivity of the experiment.

Predictive adequacy is expressed by comparing predicted and observed residuals:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \leq \sigma_{\text{exp}}.$$

Both $\delta_{\text{pred}}^{\text{test}}$ and $\delta_{\text{obs}}^{\text{test}}$ are physical-realization residuals evaluated under:

$$T_{\text{ITOF}} = (S, \prec).$$

Thus, predictive success supports the physical-realization assignment. Predictive failure constrains the model, the classification, the coefficients, or the influence mapping. It does not by itself imply temporal deformation.

The experimental closure of the framework is therefore:

$$\boxed{\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right)}$$

with:

$$\boxed{\delta_{A|B}^{\text{test}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

The role of experiment in ITOF is therefore precise. Laboratory control constrains response-structure class and influence-profile class. Measurement then determines whether the resulting physical realization converges, diverges, or remains bounded within uncertainty. In all cases, the experiment investigates measurable physical realization under invariant ordered succession, not the deformation of time itself.

8. Auxiliary Domain Examples of Physical Residuals

The experimental architecture developed in the preceding section is general. The present section gives selected auxiliary domain examples to show how measurable residuals may be represented in specific physical settings. These examples are not introduced as independent theories of pressure, chemistry, thermal response, or coupled interaction. Their role is narrower: they illustrate how measurable residuals can arise from physical realization while temporal ontology remains invariant.

8.1 Pressure-Dependent Residual Realization

Pressure-sensitive systems provide a clear example of controlled physical realization. In a pressure-domain test, the influence-profile class may be represented as:

$$[\mathcal{E}_r]^{\text{test}} = [\mathcal{E}_P]^{\text{test}},$$

where $[\mathcal{E}_P]^{\text{test}}$ denotes a controlled pressure-related influence profile.

For two systems A and B, a pressure-dependent residual may be represented by:

$$\delta^{(P),\text{test}}_{A|B}\Big|_{T_{\text{ITOF}}} \approx (\beta_{AP} - \beta_{BP})\Delta P + \frac{1}{2}(\gamma_{AP} - \gamma_{BP})(\Delta P)^2.$$

Here, β_{AP} and β_{BP} represent first-order pressure-response descriptors for systems A and B. The coefficients γ_{AP} and γ_{BP} represent nonlinear pressure-response descriptors. These coefficients are not temporal parameters. They describe how the response-structure of each system realizes a controlled pressure influence.

Thus:

$$\beta_{AP} \neq \beta_{BP} \quad \text{or} \quad \gamma_{AP} \neq \gamma_{BP}$$

may produce a measurable pressure-domain residual. But such a residual belongs to physical realization:

$$\delta^{(P),\text{test}}_{A|B}\Big|_{T_{\text{ITOF}}} \in O_{\text{phys}},$$

not to temporal deformation. Therefore:

$$\boxed{\delta^{(P),\text{test}}_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

The pressure-domain example therefore supports the central assignment of ITOF: a controlled physical influence may generate measurable residual divergence between systems without requiring any change in invariant temporal ordering.

8.2 Chemical and Thermal Residual Realization

Chemical and thermal systems provide another domain in which physical realization may differ between systems under controlled influence conditions. A thermal or chemical influence-profile class may be represented as:

$$[\mathcal{E}_r]^{\text{test}} = [\mathcal{E}_{\text{chem/T}}]^{\text{test}}.$$

A comparative chemical or thermal residual may be represented by:

$$\delta_{A|B}^{\text{chem,test}}\Big|_{T_{\text{ITOF}}} \approx (\alpha_{AT} - \alpha_{BT})\Delta T + \frac{1}{2}(\eta_{AT} - \eta_{BT})(\Delta T)^2.$$

Here, α_{AT} and α_{BT} represent first-order thermal or chemical response descriptors. The coefficients η_{AT} and η_{BT} represent nonlinear response descriptors in the same domain.

These coefficients express physical realization. They may encode differences in reaction accessibility, molecular organization, activation behavior, medium dependence, thermal sensitivity, or other physical realization features. They do not encode changes in time.

Thus, if:

$$\alpha_{AT} \neq \alpha_{BT} \quad \text{or} \quad \eta_{AT} \neq \eta_{BT},$$

then:

$$\delta_{A|B}^{\text{chem,test}}\Big|_{T_{\text{ITOF}}} \neq 0$$

may occur. The interpretation remains:

$$\boxed{\delta_{A|B}^{\text{chem,test}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

The chemical and thermal example shows the same principle in another domain. A measurable residual may be generated by the relation between response-structure and influence-profile class while temporal ontology remains invariant.

8.3 Coupled Multi-Influence Realization

Physical systems commonly receive more than one influence at a time. When influences overlap or couple, the measurable realization of the combined profile need not equal the sum of isolated realizations.

For two influences E_1 and E_2, coupled realization may be represented by:

$$\Delta X_A(E_1, E_2)|_{T_{\text{ITOF}}} \neq \Delta X_A(E_1) + \Delta X_A(E_2)|_{T_{\text{ITOF}}} .$$

A local coupled expansion may be written as:

$$\Delta X_A|_{T_{\text{ITOF}}} = a_{A1}E_1 + a_{A2}E_2 + a_{A12}E_1E_2 + a_{A11}E_1^2 + a_{A22}E_2^2 + \cdots .$$

The cross term:

$$a_{A12}E_1E_2$$

represents interaction-dependent physical realization within system A. It is not a nonlinear temporal term and not a modification of invariant ordered succession.

For two systems A and B, a coupled residual may be represented by:

$$\delta_{A|B}^{\text{coupled}}\Big|_{T_{\text{ITOF}}} \sim (a_{A12} - a_{B12})E_1E_2 + \cdots .$$

If:

$$a_{A12} \neq a_{B12},$$

then coupled residual divergence may become observable. The interpretation is again physical:

$$\boxed{\delta_{A|B}^{\text{coupled}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

Coupled realization therefore strengthens the framework rather than complicating it. It shows that residual divergence may arise not only from isolated response coefficients, but also from interaction-dependent realization of combined influence profiles. In all cases, the residual remains a physical-realization residual evaluated under invariant ordered succession.

8.4 Unified Interpretation of the Domain Examples

The pressure, chemical/thermal, and coupled examples share the same structure:

$$\delta_{A|B}^{\text{domain}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_{\text{domain}}]^{\text{test}}\right).$$

The domain label may change, but the temporal conclusion does not. Whether the residual is pressure-dependent, chemical, thermal, nonlinear, or coupled, it belongs to physical realization:

$$\delta_{A|B}^{\text{domain}} \in O_{\text{phys}},$$

while:

$$T_{\mathrm{ITOF}} \notin O_{\mathrm{phys}}.$$

Therefore:

$$\boxed{\delta^{\mathrm{domain}}_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

The function of these domain examples is not to replace detailed domain physics. Their function is to show that measured residuals can be organized as physical-realization differences under invariant temporal ordering. The next section develops how the coefficients appearing in these domain equations may be treated as local descriptors of realization rather than temporal parameters.

9. Coefficient Extraction and Interaction-Level Grounding

The preceding section introduced pressure, chemical, thermal, and coupled-domain residuals as auxiliary examples of physical realization. Those examples contain coefficients such as β, γ, α, η, a_{Ai}, and a_{Aij}. The present section clarifies the status of these coefficients.

These coefficients are not temporal parameters. They do not measure deformation of time, variation of temporal flow, or dynamical behavior of temporal ontology. They are local descriptors of how a system's response-structure realizes a specified influence profile under invariant ordered succession.

The central realization equation remains:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

A local expansion of the realization function around a reference influence state $\mathcal{E}_{A0}$ may be written as:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} \approx F_A(\Theta_A, \mathcal{E}_{A0}) + \sum_i a_{Ai} \Delta E_i + \frac{1}{2} \sum_{i,j} a_{Aij} \Delta E_i \Delta E_j + \cdots .$$

This expansion does not convert the influences E_i into isolated universal causes. It uses local influence coordinates to approximate the system's realization behavior near a controlled or reference influence profile. The coefficients describe the local sensitivity of F_A, not the behavior of time.

The first-order response descriptor is:

$$a_{Ai} = \left.\frac{\partial F_A}{\partial E_i}\right|_{(\Theta_A, \mathcal{E}_{A0})}.$$

When nonlinear or coupled effects are relevant, a second-order descriptor may be written as:

$$a_{Aij} = \left. \frac{\partial^2 F_A}{\partial E_i \partial E_j} \right|_{(\Theta_A, \mathcal{E}_{A0})}.$$

These expressions should be read as local extraction rules. They state that coefficients emerge from the relation between response-structure and realized influence profile. They do not introduce time as a hidden variable.

Accordingly:

$$a_{Ai} \neq a_{Bi}$$

or:

$$a_{Aij} \neq a_{Bij}$$

may produce measurable residual divergence between systems. But this divergence is assigned to physical realization:

$$\delta_{A|B} \Big|_{T_{\mathrm{ITOF}}} \sim \sum_i (a_{Ai} - a_{Bi}) \Delta E_i + \frac{1}{2} \sum_{i,j} (a_{Aij} - a_{Bij}) \Delta E_i \Delta E_j + \cdots .$$

Therefore:

$$\boxed{a_{Ai} \neq a_{Bi} \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

and:

$$\boxed{a_{Aij} \neq a_{Bij} \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

The coefficients are physical-realization descriptors. They belong to the response of systems under influence profiles, not to temporal ontology.

A deeper interaction-level grounding may be represented schematically by:

$$H_A(\Theta_A, \mathcal{E}_A) \to \Delta E_k \to \Delta X_A \to R_{A|B} \to \delta_{A|B}.$$

Here $H_A(\Theta_A, \mathcal{E}_A)$ denotes an interaction-level representation of system A's physical realization structure. It is not introduced as a new foundation independent of Θ_A. Rather, it is a possible deeper physical model of how the response-structure and influence profile generate measurable evolution.

The term ΔE_k denotes an interaction-level physical modification, such as an energy-level shift, transition change, resonance shift, state modification, or other domain-specific physical change. The pathway states that microscopic or interaction-level modifications may produce observable realization, which then generates comparative ratios and residuals.

If useful in a secondary explanatory context, one may write:

$$H_A = H_{0,A}(\Theta_A) + H_{\text{int},A}(\mathcal{E}_A).$$

This decomposition is not foundational. It only separates intrinsic response-structure representation from interaction-dependent influence representation in a specific modeling context. The foundational relation remains:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The interaction-level pathway is therefore a grounding direction, not a replacement of the temporal ontology. It may help derive or constrain coefficients, but it does not make time a dynamical input.

Predictive closure is correspondingly expressed as:

$$|\delta_{\text{pred}} - \delta_{\text{obs}}| \leq \sigma_{\text{exp}}.$$

This is domain-level predictive closure, not universal microscopic closure. The framework becomes predictive within a domain when the relevant response-structure class, influence-profile class, coefficients, and uncertainty bounds are independently constrained.

Here δ_{pred} is not a predicted temporal deformation. It is a predicted physical-realization residual. More explicitly:

$$\delta_{\text{pred}}|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

or, in a controlled class-level experimental domain,

$$\delta_{\text{pred}}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Predictive success means that the physical-realization model has correctly constrained the measurable residual within experimental uncertainty. Predictive failure means that the response-structure classification, influence-profile mapping, coefficients, or model assumptions require refinement. It does not by itself establish temporal deformation.

This point is essential. The absence of immediate universal microscopic closure does not undermine the temporal ontology of ITOF. It defines the future physical program: derive, calibrate, constrain, and test the realization coefficients domain by domain.

The coefficient and grounding structure may therefore be summarized as:

$$\boxed{a_{Ai} = \frac{\partial F_A}{\partial E_i}\bigg|_{(\Theta_A, \mathcal{E}_{A0})}}$$

$$\boxed{H_A(\Theta_A, \mathcal{E}_A) \to \Delta E_k \to \Delta X_A \to R_{A|B} \to \delta_{A|B}}$$

$$\boxed{|\delta_{\text{pred}} - \delta_{\text{obs}}| \leq \sigma_{\text{exp}}}$$

with the temporal closure:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

The conclusion of this section is that coefficients and microscopic pathways ground measurable physical realization. They do not introduce temporal parameters. They strengthen the framework by showing how residuals may become progressively derivable and predictive while preserving invariant ordered succession.

10. Relativistic Reassignment of Measured Asymmetry

The preceding sections established that measured residuals belong to physical realization under invariant ordered succession. This section applies that architecture directly to relativistic temporal interpretation. The central issue is not whether relativistic measurements report asymmetries. They do. The issue is whether those measured asymmetries must be assigned to deformation of temporal ontology.

Relativistic interpretation commonly assigns measured asymmetry between clocks, frequencies, signals, particle processes, or physical systems to a difference in temporal intervals or spacetime-temporal structure. In compressed form, this assignment may be written as:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

This expression does not merely report a measurement. It assigns the measured physical difference to temporal difference. ITOF rejects this assignment as a necessary ontological conclusion. The disagreement is therefore not located at the level of raw empirical asymmetry. It is located at the level of ontological assignment. ITOF accepts the measured difference, but denies that the measured difference carries its temporal interpretation within itself.

Within ITOF, the measured asymmetry is preserved, but its attribution is changed. The measured difference is assigned to physical realization:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

The temporal ontology remains invariant:

$$T_A = T_B = T_{\text{ITOF}}.$$

Therefore:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

This is the fundamental reassignment. Relativistic measurements may establish measurable asymmetry. They do not, by themselves, establish that time itself is a deformable physical entity.

The distinction may be stated as follows:

$$\boxed{\text{Relativistic temporal assignment: } \Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.}$$

$$\boxed{\text{ITOF physical-realization assignment: } \Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).}$$

The first assigns measured asymmetry to temporal deformation. The second assigns measured asymmetry to physical realization under invariant temporal ordering.

This distinction is not a denial of operational success. Relativistic equations may remain highly effective as operational measurement structures. Clock corrections, frequency-shift calculations, propagation relations, navigation corrections, and particle-process comparisons may remain empirically successful. The point is that operational adequacy does not by itself determine temporal ontology.

$$\boxed{\text{Operational adequacy} \not\Rightarrow \text{temporal ontology.}}$$

More explicitly:

$$\text{accurate measurement correction} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

Operational success shows that a mathematical structure organizes observable relations effectively. It does not prove that the ontology assigned to those relations is uniquely correct. ITOF therefore preserves measured relativistic asymmetries as operational data while rejecting the necessity of interpreting them as deformation of time itself.

The reason for this reassignment follows from the influence-character exclusion principle:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Physical influences possess properties through which they act. Time, in ITOF, possesses ordering structure. It does not carry the constitutive properties by which physical influences act: intensity, direction, energetic transfer, interaction channel, coupling capacity, propagation mode, or field character. Therefore, measured asymmetry cannot be assigned to time as a physical influence unless temporal ordering is first shown to possess influence-character.

Relativistic interpretation treats clock-rate asymmetry, gravitational frequency shift, kinematic comparison, propagation correction, and particle-process asymmetry as evidence for temporal variation. ITOF treats these as evidence for measurable physical asymmetry within systems and measurement structures. The distinction is not about the existence of the asymmetry; it is about the layer to which the asymmetry is assigned.

For clock-rate asymmetry, the relativistic temporal reading may be expressed as:

$$\Delta f_A \neq \Delta f_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

The ITOF reading is:

$$\Delta f_A \neq \Delta f_B|_{T_{\mathrm{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

The clock is a physical system. Its measurable frequency behavior belongs to physical realization. It is not a direct measurement of temporal ontology itself.

For gravitational or kinematic measurement asymmetry, the same reassignment holds. If a system exhibits a measurable difference under gravitational field, acceleration, velocity, propagation condition, or other influence profile, ITOF assigns the difference to realized physical conditions and response-structure:

$$\delta^{\mathrm{rel}}_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}^{\mathrm{rel}}_A, \mathcal{E}^{\mathrm{rel}}_B).$$

Here $\mathcal{E}^{\mathrm{rel}}_A$ and $\mathcal{E}^{\mathrm{rel}}_B$ denote the relevant realized influence profiles in the relativistic measurement domain. They may include gravitational, kinematic, signal-propagation, field, acceleration, or environmental conditions. These are physical influences or realized influence profiles. They are not temporal ontology.

Accordingly:

$$\delta^{\mathrm{rel}}_{A|B}\Big|_{T_{\mathrm{ITOF}}} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

This relation is the interpretive center of the relativistic reassignment. It preserves the residual and rejects the temporal conclusion.

The same structure applies to particle-process asymmetry. If a particle process exhibits a measured lifetime or decay-related asymmetry, ITOF does not deny the measurement. It assigns the measured difference to physical realization:

$$\Delta X_{\mathrm{particle},A} \neq \Delta X_{\mathrm{particle},B}|_{T_{\mathrm{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

The process may be influenced by state structure, interaction conditions, energy, motion, field environment, or measurement architecture. The measured difference remains a physical-realization difference unless time itself is shown to possess physical influence-character.

Thus, the general ITOF reassignment is:

$$\boxed{\Delta X_A \neq \Delta X_B|_{T_{\mathrm{ITOF}}} \Rightarrow \text{differential physical realization,}}$$

not:

$$\boxed{\Delta X_A \neq \Delta X_B \Rightarrow \text{temporal deformation.}}$$

This position is a foundational alternative to relativistic temporal ontology. It does not claim that relativistic experimental data are false. It claims that the temporal conclusion assigned to those data is not forced by the data themselves. Relativistic tests establish measurable asymmetry. ITOF assigns that asymmetry to physical realization under invariant ordered succession.

The reassignment may be compressed into the following chain:

$$T_{\text{ITOF}} = (S, \prec),$$

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\},$$

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\delta_{A|B}\Big|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

This chain is the ITOF response to relativistic temporal interpretation. It accepts the operational reality of measured asymmetry, rejects the necessity of temporal deformation, and relocates explanatory structure in physical realization. The result is not a supplementary interpretation of relativity, but a foundational alternative to relativistic temporal ontology.

10.1 Compact Reassignment Summary

The reassignment may be summarized across representative domains as follows. Clock asymmetry is not denied, but it is assigned to physical realization of the clock system rather than to deformation of time itself. Gravitational and kinematic asymmetries are treated as measured physical asymmetries under realized influence profiles, not as direct measurements of temporal ontology. Signal corrections remain operationally valid, but operational validity does not determine temporal ontology. Particle-process asymmetries are assigned to physical process realization unless time itself is shown to possess influence-character.

Thus, across these domains, the contrast is:

$$\text{relativistic assignment: measured asymmetry} \Rightarrow \text{temporal deformation,}$$

while:

ITOF assignment: measured asymmetry $\Rightarrow$ differential physical realization under T_{ITOF}.

The compact closure is:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B), \qquad \delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

This summary does not introduce a new theoretical layer. It only condenses the reassignment already developed in the section.

11. Geometry and Relational Measurement

The preceding section reassigned measured relativistic asymmetry from temporal deformation to physical realization under invariant ordered succession. The present section clarifies the status of geometry within that reassignment.

Geometry is operationally indispensable in physics. It organizes spatial relations, propagation relations, signal comparison, coordinate descriptions, metric relations, and measurable relational structure. ITOF does not reject the operational value of geometry. It rejects the identification of operational geometrical description with temporal ontology itself.

Operational measurable geometry may be represented by:

$$G_{\mathrm{meas}}.$$

This symbol denotes measurable relational structure extracted from observable physical comparisons. Such structure may include spatial comparison, signal relation, propagation organization, clock comparison, frequency relation, coordinate description, or metric organization. These relations belong to the observable physical domain:

$$G_{\mathrm{meas}} \in O_{\mathrm{phys}}.$$

By contrast, temporal ontology in ITOF is:

$$T_{\mathrm{ITOF}} = (S, \prec),$$

and:

$$T_{\mathrm{ITOF}} \notin O_{\mathrm{phys}}.$$

Therefore:

$$\boxed{G_{\mathrm{meas}} \neq T_{\mathrm{ITOF}}.}$$

This distinction is essential. A successful geometrical description of observable relations does not by itself establish that temporal ontology is geometrical, dynamical, or deformable. It establishes that measurable physical relations can be organized geometrically.

Geometry also does not function as physical agency. A geometrical relation may describe how observables are organized, but it does not by itself produce the physical realization measured in a system. Thus:

$$G_{\text{meas}} \neq A_{\text{phys}},$$

where A_{phys} denotes physical agency or interaction capacity.

The framework therefore distinguishes three layers:

$$T_{\text{ITOF}} = (S, \prec),$$

$$G_{\text{meas}} \in O_{\text{phys}},$$

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The first relation defines temporal ontology. The second identifies operational measurable geometry. The third gives physical realization under invariant temporal ordering. These three layers should not be collapsed into one another.

A measured geometrical relation may be operationally valid while the physical processes producing the measurable relation remain structure-dependent. For example, signal propagation, clock comparison, resonance relation, or frequency shift may be organized geometrically, while the measurable behavior of the participating systems still belongs to physical realization:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

Thus, if two systems exhibit different measurable relations:

$$\Delta X_A \neq \Delta X_B,$$

ITOF does not infer:

$$\delta G_{\text{meas}} \Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

Instead, the framework assigns the difference to physical realization under invariant ordering:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

Accordingly:

$$\boxed{G_{\text{meas}} \text{ works operationally} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

Thus, the framework does not weaken operational geometry; it limits ontological over-assignment. Geometry remains valid as a relational measurement structure, while the physical production of measured differences remains assigned to realization architecture.

The same point applies to spacetime-temporal interpretation. A spacetime model may organize measured relations with high operational success. That success does not logically force the conclusion that time itself is a deformable physical entity. Operational adequacy establishes the effectiveness of a measurement structure; it does not by itself settle temporal ontology. The ITOF assignment is therefore:

$$G_{\text{meas}} \in O_{\text{phys}}, \qquad G_{\text{meas}} \neq T_{\text{ITOF}}, \qquad G_{\text{meas}} \neq A_{\text{phys}}.$$

Measured geometry belongs to the observable physical domain. Temporal ontology belongs to invariant ordered succession. Physical realization belongs to the relation between response-structure and realized influence profile.

The conclusion of this section is:

$$\boxed{G_{\text{meas}} \in O_{\text{phys}}, \qquad G_{\text{meas}} \neq T_{\text{ITOF}}, \qquad G_{\text{meas}} \neq A_{\text{phys}}.}$$

Geometry remains operationally valid. It remains useful for measurement, comparison, propagation, and relational organization. But its operational success does not establish temporal deformation. Within ITOF, geometry describes measurable relations; physical systems realize measurable change; time remains invariant ordered succession.

12. Limitations and Open Extensions

The present formulation establishes the temporal ontology, physical-realization assignment, residual architecture, experimental structure, and relativistic reassignment of ITOF. It does not claim complete closure of every physical realization pathway. The purpose of this section is to define the scope of the present formulation without weakening its central conclusion.

The framework is therefore closed at the level of temporal ontology but open at the level of physical derivation. This distinction is essential. Openness in coefficient extraction, influence-profile mapping, or microscopic grounding does not reopen the definition of time; it only defines the unfinished physical program through which measurable realization may be progressively derived.

The central conclusion remains:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

This conclusion does not depend on complete derivation of every physical coefficient in every domain. It depends on the prior distinction between temporal ontology and measurable physical realization:

$$T_{\text{ITOF}} = (S, \prec),$$

$$T_{\text{ITOF}} \notin O_{\text{phys}},$$

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Thus, the framework may be incomplete in some physical realization domains without making time a physical influence or a directly measurable object.

12.1 Microscopic Coefficient Derivation

The framework uses coefficients such as:

$$\beta, \quad \gamma, \quad \alpha, \quad \eta, \quad a_{Ai}, \quad a_{Aij}.$$

These coefficients are interpreted as descriptors of physical realization, not temporal parameters. In the present formulation, they may be measured, calibrated, constrained, or locally derived through domain-specific models.

A general coefficient relation may be represented by:

$$a_{Ai} = \left.\frac{\partial F_A}{\partial E_i}\right|_{(\Theta_A, \mathcal{E}_{A0})}.$$

However, the framework does not claim that all such coefficients have already been derived from first principles for every physical domain. Complete microscopic derivation remains an open extension:

$$H_A(\Theta_A, \mathcal{E}_A) \to \Delta E_k \to \Delta X_A \to R_{A|B} \to \delta_{A|B}.$$

This pathway identifies the direction of deeper grounding. It does not yet provide universal closed-form coefficient extraction across all systems.

The limitation is therefore:

coefficient grounding is progressive, not universally closed in the present formulation.

This does not alter the temporal closure:

$$a_{Ai} \neq a_{Bi} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

12.2 Domain-Specific Predictive Closure

Predictive closure must be achieved domain by domain. In a controlled domain, the predictive residual is:

$$\delta_{\text{pred}}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Empirical adequacy requires:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \le \sigma_{\text{exp}}.$$

The present framework establishes this predictive architecture. It does not claim that every domain has already been fully calibrated, tested, or closed. Pressure-dependent systems, thermal systems, chemical systems, coupled nonlinear systems, atomic systems, resonant systems, and relativistic measurement contexts may each require specific coefficient extraction and influence-profile mapping.

The limitation is therefore:

The general residual architecture is established, while complete domain closure remains progressive.

This limitation concerns predictive refinement, not temporal ontology.

12.3 Influence-Profile Mapping

The framework represents aggregated physical influence as:

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n)).$$

This relation states that physical influences may aggregate, overlap, couple, or be constrained into realized influence profiles. In controlled experiments, this becomes:

$$\{E_i(\Pi_i)\}^{\text{test}} \to [\mathcal{E}_r]^{\text{test}}.$$

The limitation is that full influence-profile mapping may be difficult in complex natural environments. In laboratory settings, influence profiles can be constrained more precisely. In open natural systems, they may be identified only approximately.

This does not invalidate the architecture. It defines the level of expected precision:

$$\text{controlled domain} \Rightarrow \text{stronger influence-profile constraint},$$

$$\text{uncontrolled natural domain} \Rightarrow \text{weaker influence-profile constraint}.$$

In both cases, influence-profile uncertainty belongs to physical realization, not temporal ontology.

12.4 Response-Structure Classification

The framework classifies systems through response-structure:

$$A \in [\Theta_k].$$

This classification is used to compare physical realization under specified influence profiles. It is not meant to become an open-ended biological, material, or taxonomic expansion. Broad classes may be used when useful, but their internal details are contained within the response-structure class.

The limitation is that response-structure classification may be approximate until experimentally constrained:

$$A \in [\Theta_k] \quad \text{may be approximate before calibration.}$$

Improved classification may reduce residual uncertainty. Poor classification may increase model error. But classification uncertainty does not imply temporal deformation.

Thus:

$$\text{classification error} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

12.5 Relativistic Predictive Replacement

ITOF provides a foundational alternative to relativistic temporal ontology. It does not claim, in the present formulation, to have already replaced every relativistic predictive equation across all domains.

The reassignment is clear:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B$$

is replaced ontologically by:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

However, a complete predictive replacement of relativistic models requires domain-specific derivation, coefficient extraction, and experimental comparison. The present formulation establishes the ontological reassignment and physical-realization architecture. Full predictive competition with relativistic models remains a progressive research direction.

The limitation is therefore:

ontological reassignment is established; complete predictive replacement is progressive.

This distinction is essential. ITOF challenges the temporal conclusion assigned to measured relativistic asymmetries. It does not deny the operational success of relativistic measurement structures.

12.6 Operational Geometry

The framework distinguishes measurable geometry from temporal ontology:

$$G_{\text{meas}} \in O_{\text{phys}},$$

$$G_{\text{meas}} \neq T_{\text{ITOF}},$$

$$G_{\text{meas}} \neq A_{\text{phys}}.$$

The limitation is that further mathematical development may be required to relate operational geometrical structures more explicitly to response-structure and influence-profile realization. The present formulation establishes the distinction; it does not claim final mathematical closure of all geometry-realization relations.

This limitation does not weaken the temporal claim:

$$G_{\text{meas}} \neq T_{\text{ITOF}}.$$

Geometry may remain operationally successful while temporal ontology remains invariant ordered succession.

12.7 Scope of the Present Formulation

The present formulation establishes:

$$T_{\text{ITOF}} = (S, \prec),$$

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\},$$

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\delta_{A|B}\Big|_{T_{\rm ITOF}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\rm ITOF} \neq 0.$$

It also establishes the experimental architecture:

$$\delta^{\rm test}_{A|B}\Big|_{T_{\rm ITOF}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\rm test}, [\mathcal{E}_s]^{\rm test}\right).$$

The open extensions concern:

coefficient derivation,

domain-specific predictive closure,

controlled influence-profile mapping,

response-structure classification refinement,

microscopic grounding,

operational geometry development,

and:

domain-by-domain comparison with existing predictive models.

These are physical-realization extensions. They do not reopen the definition of time. They refine how measurable physical realization is derived, predicted, and tested under invariant ordered succession.

The conclusion of this section is therefore:

$$\boxed{\text{ITOF is open in physical-realization derivation, but closed in its temporal ontology.}}$$

The framework does not claim final completion of all physical derivations. It does claim that measured residuals, coefficients, operational geometry, and relativistic asymmetries should not be assigned to temporal deformation unless time itself is shown to possess physical influence-character.

13. Constraint and Challenge Conditions

The preceding section defined the scope and open extensions of the present formulation. The present section states the conditions under which the framework would be constrained or challenged. This section is not defensive. Its purpose is to make clear that ITOF is not protected from empirical or conceptual pressure, but that any challenge must address the correct level of the framework.

The central assignment of ITOF is:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

with the temporal closure:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

Accordingly, a challenge to the framework must do more than show that measured asymmetry exists. The existence of measured asymmetry is already accepted. The relevant question is whether that asymmetry must be assigned to temporal deformation rather than to physical realization.

13.1 Challenge to the Influence-Character Exclusion Principle

The first and strongest challenge would be evidence that temporal ordering itself possesses physical influence-character. ITOF asserts:

$$T_{\mathrm{ITOF}} \notin \{E_i(\Pi_i)\}.$$

A direct challenge would require showing:

$$T_{\mathrm{ITOF}} \in \{E_i(\Pi_i)\}.$$

This would require evidence that time itself possesses physical properties through which it acts, such as intensity, direction, energetic transfer, interaction channel, coupling capacity, field behavior, propagation structure, or another physically operative influence-character.

A measured difference between systems is not sufficient for this challenge. A measured difference may show that two physical systems realize evolution differently. It does not show that time itself acts as a physical influence. To challenge the influence-character exclusion principle, the evidence must target time itself as an influence-bearing entity.

Thus, the relevant condition is:

$$\boxed{T_{\mathrm{ITOF}} \in \{E_i(\Pi_i)\}}$$

not merely:

$$\Delta X_A \neq \Delta X_B.$$

13.2 Challenge to the Physical-Realization Assignment

The second challenge would be evidence that residuals cannot be assigned to response-structure and realized influence profile. ITOF assigns residuals as:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

A direct challenge would require showing that:

$$\delta_{A|B} \text{ does not depend on } (\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

If residuals were shown to be independent of response-structure and realized influence profiles across controlled domains, the physical-realization assignment would be weakened.

However, an unexplained residual is not automatically evidence of temporal deformation. It may indicate incomplete influence-profile mapping, poor response-class classification, missing coefficients, nonlinear coupling not yet included, or insufficient model resolution. A residual becomes a challenge to ITOF only when the relevant physical variables have been independently constrained and the residual still systematically resists physical-realization assignment.

13.3 Challenge from Controlled Predictive Failure

In controlled tests, ITOF represents predicted residuals as:

$$\delta_{\mathrm{pred}}^{\mathrm{test}}\Big|_{T_{\mathrm{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\mathrm{test}}, [\mathcal{E}_s]^{\mathrm{test}}\right).$$

Empirical adequacy requires:

$$\left|\delta_{\mathrm{pred}}^{\mathrm{test}} - \delta_{\mathrm{obs}}^{\mathrm{test}}\right| \leq \sigma_{\mathrm{exp}}.$$

A controlled predictive challenge would occur if:

$$\left|\delta_{\mathrm{obs}}^{\mathrm{test}} - \delta_{\mathrm{pred}}^{\mathrm{test}}\right| > \sigma_{\mathrm{exp}} + \epsilon_{\mathrm{model}},$$

after the response-structure classes, influence-profile classes, relevant coefficients, and model-error allowance have been independently constrained.

Here $\epsilon_{\mathrm{model}}$ denotes the admitted model-error tolerance of the tested domain. This condition would constrain the predictive realization model. It would not immediately prove temporal deformation. It would first indicate that the physical-realization architecture in that domain requires refinement.

Only if such predictive failures persisted after systematic constraint of response-structure, influence-profile mapping, coefficients, nonlinear terms, and experimental uncertainty would the framework face a deeper challenge.

13.4 Operational Success Does Not Establish Temporal Ontology

The fourth condition concerns operationally successful formalisms. ITOF does not deny that a geometrical, relativistic, or operational measurement structure may organize observations effectively. The framework denies that operational success alone determines temporal ontology.

This distinction may be expressed as:

$$\text{operational success} \not\Rightarrow \text{unique temporal ontology.}$$

More specifically:

$$\text{successful relativistic correction} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

A relativistic correction may be empirically useful. A geometrical structure may organize measured relations effectively. A clock-comparison formula may produce accurate operational results. None of these facts alone proves that time itself is a deformable physical entity.

To challenge ITOF, one must show not merely that the operational formalism works, but that its success uniquely requires temporal deformation and cannot be reassigned to physical realization under invariant ordered succession.

13.5 Significant and Null Residuals

A significant tested residual satisfies:

$$|\delta^{\text{test}}_{A|B}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}}.$$

Within ITOF, this indicates experimentally significant differential physical realization. It does not imply:

$$\delta T_{\text{ITOF}} \neq 0.$$

A bounded or null tested residual satisfies:

$$|\delta^{\text{test}}_{A|B}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}}.$$

This constrains the magnitude of differential physical realization within the tested domain. It may indicate that the systems are sufficiently similar, the influence profiles are not sufficiently differentiated, the relevant coefficients are small, or the experiment lacks the sensitivity to resolve the difference.

A null result does not make time observable. A significant result does not deform time. Both outcomes belong to physical realization:

$$\delta^{\mathrm{test}}_{A|B} \in O_{\mathrm{phys}}, \qquad T_{\mathrm{ITOF}} \notin O_{\mathrm{phys}}.$$

13.6 Summary of Challenge Conditions

The principal challenge conditions may be summarized as follows.

First:

$$\boxed{T_{\mathrm{ITOF}} \in \{E_i(\Pi_i)\}}$$

would challenge the claim that time has no physical influence-character.

Second:

$$\boxed{\delta_{A|B} \text{ does not depend on } (\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B)}$$

would challenge the assignment of residuals to physical realization.

Third:

$$\boxed{\left|\delta^{\mathrm{test}}_{\mathrm{obs}} - \delta^{\mathrm{test}}_{\mathrm{pred}}\right| > \sigma_{\mathrm{exp}} + \epsilon_{\mathrm{model}}}$$

would constrain the predictive realization model in a controlled domain.

Fourth:

$$\boxed{\text{operational success} \not\Rightarrow \text{unique temporal ontology}}$$

blocks the inference from empirical usefulness alone to deformable time.

13.7 Final Constraint Closure

The framework is therefore open to constraint, but the constraint must target the correct level. Measured asymmetry alone is not enough. Operational success alone is not enough. Model incompleteness alone is not enough.

A genuine challenge must either show that time itself possesses physical influence-character, or show that measured residuals cannot be assigned to response-structure and realized influence profiles after those physical variables have been independently constrained.

Until such conditions are met, the central closure remains:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

This is the final interpretive boundary of the framework: physical evidence may constrain physical realization, coefficient extraction, influence mapping, and predictive closure, but measured residuals do not become temporal deformation unless time itself is shown to possess physical influence-character.

14. Conclusion and Minimal Equation Set

The present formulation has developed the Invariant Temporal Ordering Framework as a focused mathematical and interpretive architecture for separating temporal ontology from measurable physical realization. The central result is direct: measured asymmetry belongs to physical realization under invariant ordered succession; it does not, by itself, establish deformation of time.

The framework begins with the definition of temporal ontology:

$$T_{\mathrm{ITOF}} = (S, \prec).$$

Here S denotes physically admissible states, and $\prec$ denotes invariant ordered succession. This relation establishes prior–subsequent order. It does not represent measurable duration, dynamical flow, physical substance, energetic transfer, or causal agency.

Observable physical evolution is represented separately:

$$X : S \to \mathbb{R},$$

$$\Delta X_{ij} = X(S_j) - X(S_i).$$

Thus:

$$S_i \prec S_j \neq \Delta X_{ij}.$$

The distinction is fundamental. Ordered succession belongs to temporal ontology. Measurable difference belongs to physical realization.

A measurable difference presupposes ordered distinguishability:

$$\Delta X_{ij} \Rightarrow S_i \prec S_j,$$

but ordered succession does not impose a universal magnitude of measurable change:

$$S_i \prec S_j \not\Rightarrow |\Delta X_{ij}| = \text{constant}.$$

Accordingly:

$$\Delta X,\ R_{A|B},\ \delta_{A|B} \in O_{\text{phys}},$$

while:

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

This establishes the first closure of the framework: measurement accesses physical observables, not temporal ontology as a measurable object.

The second closure is that time has no physical agency. Ordered succession is not a force, field, energetic carrier, interaction channel, or causal mechanism:

$$(S, \prec) \not\Rightarrow A_{\text{phys}}.$$

Physical influences possess influence-character:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which the influence acts. Time does not belong to this class:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Therefore:

$$\Delta X_A \neq F_A(\Theta_A, T_{\text{ITOF}}).$$

Time is not a physical input to measurable realization.

The positive realization relation is instead:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

Here Θ_A denotes the physical structure of system A as response organization:

$$\Theta_A \equiv \text{the physical structure of system } A \text{ as response organization.}$$

The aggregated influence profile realized upon system A is:

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}\big(\mathcal{O}, E_1(\Pi_1), \ldots, E_n(\Pi_n)\big).$$

The symbol $\mathcal{O}$ denotes ordered extension as an observational domain. It is not a physical influence and does not generate physical action. It provides the ordered domain in which physical influences may be tracked and compared.

The realization equation is therefore not:

$$\Delta X_A = F_A(\Theta_A, \mathcal{E}_A, T_{\mathrm{ITOF}}),$$

but:

$$\boxed{\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).}$$

This is the central equation of physical realization under invariant temporal ordering.

For comparative measurement, the response ratio is:

$$R_{A|B} = \frac{\Delta X_A}{\Delta X_B},$$

and the residual deviation is:

$$\delta_{A|B} = R_{A|B} - 1.$$

Substituting the realization functions gives:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A)}{F_B(\Theta_B, \mathcal{E}_B)} - 1.$$

Equivalently:

$$\boxed{\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).}$$

This relation assigns residual divergence to differences in response-structure, differences in realized influence profile, or both. It does not assign the residual to time.

The temporal closure of the framework is:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

This closure applies across the entire formulation. It applies to pressure-dependent residuals, chemical and thermal residuals, coupled nonlinear residuals, relativistic measurement asymmetries, clock-rate asymmetries, signal relations, particle-process comparisons, and geometrical measurement structures.

At the experimental level, tested influence profiles and response classes are constrained:

$$\{E_i(\Pi_i)\}^{\mathrm{test}} \to [\mathcal{E}_r]^{\mathrm{test}},$$

$$A \in [\Theta_k].$$

The tested realization relation is:

$$\Delta X_A^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A^{\text{test}}).$$

The class-level tested residual is:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

A significant residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}},$$

while a bounded or null residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}}.$$

Both outcomes constrain physical realization. Neither outcome alters temporal ontology.

Predictive adequacy is expressed by:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \leq \sigma_{\text{exp}}.$$

This is a physical-realization closure condition, not a temporal-deformation condition.

The framework also preserves the distinction between operational geometry and temporal ontology:

$$G_{\text{meas}} \in O_{\text{phys}},$$

$$G_{\text{meas}} \neq T_{\text{ITOF}},$$

$$G_{\text{meas}} \neq A_{\text{phys}}.$$

Geometry may organize measurable relations successfully. That success does not establish that time itself is a deformable physical entity.

The relativistic reassignment is therefore direct. The relativistic temporal assignment is:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

The ITOF assignment is:

$$\Delta X_A \neq \Delta X_B|_{T_{\rm ITOF}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B),$$

with:

$$T_A = T_B = T_{\rm ITOF}.$$

Thus:

$$\delta_{A|B} \neq 0 \nRightarrow \delta T_{\rm ITOF} \neq 0.$$

Operational adequacy does not by itself determine temporal ontology. Relativistic measurement structures may remain operationally effective while their temporal interpretation remains open to foundational reassignment. ITOF preserves the measured asymmetry and rejects the necessity of assigning that asymmetry to deformable time.

The resulting framework is therefore closed in its temporal ontology and open in its physical-realization derivation. Its central claim does not require that all coefficients be universally derived in the present formulation. It requires that measured residuals be assigned first to observable physical realization unless temporal ordering itself is shown to possess physical influence-character. In this sense, the framework establishes a stable temporal ontology together with a progressively constrainable physical-realization program.

The minimal final equation set of the framework is therefore:

$$\boxed{T_{\rm ITOF} = (S, \prec)}$$

$$\boxed{T_{\rm ITOF} \notin \{E_i(\Pi_i)\}}$$

$$\boxed{\Delta X_A|_{T_{\rm ITOF}} = F_A(\Theta_A, \mathcal{E}_A)}$$

$$\boxed{\delta_{A|B}\Big|_{T_{\rm ITOF}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B)}$$

$$\boxed{\delta_{A|B} \neq 0 \nRightarrow \delta T_{\rm ITOF} \neq 0.}$$

These equations define the final structure of the present formulation. Time is invariant ordered succession. Time is not a physical influence. Measurable evolution is physical realization under invariant ordering. Residuals are physical-realization differences. Nonzero residuals do not imply deformation of temporal ontology.

The resulting framework is therefore a foundational alternative to relativistic temporal ontology. It does not deny measured asymmetry. It reassigns measured asymmetry to the physical systems, influence profiles, response structures, and realization pathways through which measurable evolution occurs within invariant ordered succession.

A. Notation and Core Definitions

This appendix summarizes the principal symbols and relations used in the framework. It does not introduce new theoretical claims. Its purpose is to provide a compact reference for the mathematical structure developed in the main text.

A.1 Temporal Ontology

Temporal ontology in ITOF is represented by:

$$T_{\text{ITOF}} = (S, \prec),$$

where S denotes the set of physically admissible states and $\prec$ denotes invariant ordered succession.

The ordered structure:

$$S_0 \prec S_1 \prec S_2 \prec \cdots$$

represents invariant ordered succession, not measurable temporal magnitude.

The ordering relation and measurable physical difference are distinct:

$$S_i \prec S_j \neq \Delta X_{ij}.$$

A measurable difference presupposes ordered distinguishability:

$$\Delta X_{ij} \Rightarrow S_i \prec S_j,$$

but ordered succession does not determine a universal magnitude of measurable change:

$$S_i \prec S_j \not\Rightarrow |\Delta X_{ij}| = \text{constant}.$$

A.2 Observable Physical Evolution

Observable physical quantities are represented by:

$$X : S \to \mathbb{R}.$$

A measurable difference between two ordered states is:

$$\Delta X_{ij} = X(S_j) - X(S_i).$$

The observable physical domain is denoted by O_{phys}. Within ITOF:

$$\Delta X,\ R_{A|B},\ \delta_{A|B} \in O_{\text{phys}},$$

while:

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

Thus, measurement accesses physical observables, not temporal ontology as a directly measurable object.

A.3 Physical Influence and Influence-Character

A physical influence is represented by:

$$E_i = E_i(\Pi_i),$$

where Π_i denotes the properties through which the influence acts.

Time does not possess influence-character:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Equivalently:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\} \quad \Rightarrow \quad T_{\text{ITOF}} \text{ is not a physical influence.}$$

The ordered relation also lacks physical agency:

$$(S, \prec) \not\Rightarrow A_{\text{phys}}.$$

Therefore, measurable realization is not represented as:

$$\Delta X_A = F_A(\Theta_A, T_{\text{ITOF}}).$$

A.4 Aggregated Influence Profile

The aggregated influence profile realized upon system A is:

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n)).$$

Here $\mathcal{O}$ denotes ordered extension as an observational domain. It is not a physical influence:

$$\mathcal{O} \neq E_i(\Pi_i),$$

and:

$$\mathcal{O} \not\Rightarrow A_{\text{phys}}.$$

A.5 Response Organization

The response-structure of system A is denoted by:

$$\Theta_A.$$

It is defined as:

$$\Theta_A \equiv \text{the physical structure of system } A \text{ as response organization.}$$

The framework does not use the following as a foundational equation:

$$\Theta_A = \Theta_A(\Sigma_A, I_A, \Lambda_A).$$

Such decompositions may be used only as secondary domain-specific explanations. At the foundational level, internal structure and response organization are one meaning inside Θ_A.

A system may be classified by response-structure class:

$$A \in [\Theta_k].$$

No independent foundational class symbol is required.

A.6 Measurable Realization

The central realization equation is:

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The vertical condition indicates evaluation under invariant ordered succession. It does not make T_{ITOF} an input variable inside F_A.

The rejected temporal-input form is:

$$\Delta X_A = F_A(\Theta_A, \mathcal{E}_A, T_{\text{ITOF}}).$$

A.7 Influence Domain and Response Domain

The influence domain may be classified as:

$$\{E_i(\Pi_i)\} \to [\mathcal{E}_r],$$

where $[\mathcal{E}_r]$ denotes a realized influence-profile class.

The response domain is represented by:

$$A \in [\Theta_k].$$

A class-level realization relation may be written as:

$$[\Theta_k] \times [\mathcal{E}_r] \to \Delta X_{k,r}|_{T_{\mathrm{ITOF}}}.$$

This is a classification relation for physical realization under invariant ordering. It is not a temporal-deformation equation.

A.8 Comparative Ratio and Residual

The comparative response ratio is:

$$R_{A|B} = \frac{\Delta X_A}{\Delta X_B}.$$

The residual deviation is:

$$\delta_{A|B} = R_{A|B} - 1.$$

Using the realization functions:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A)}{F_B(\Theta_B, \mathcal{E}_B)} - 1.$$

Equivalently:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

The central temporal closure is:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

A.9 Experimental Residual Structure

A tested influence profile is represented by:

$$\{E_i(\Pi_i)\}^{\text{test}} \to [\mathcal{E}_r]^{\text{test}}.$$

A tested realization is:

$$\Delta X_A^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A^{\text{test}}).$$

The tested residual may be written as:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

A significant residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}}.$$

A bounded or null residual satisfies:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \le \sigma_{\text{exp}}.$$

Predictive adequacy is represented by:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \le \sigma_{\text{exp}}.$$

A.10 Auxiliary Domain Forms

A pressure-domain residual may be represented by:

$$\delta_{A|B}^{(P),\text{test}}\Big|_{T_{\text{ITOF}}} \approx (\beta_{AP} - \beta_{BP})\Delta P + \frac{1}{2}(\gamma_{AP} - \gamma_{BP})(\Delta P)^2.$$

A chemical or thermal residual may be represented by:

$$\delta_{A|B}^{\text{chem},\text{test}}\Big|_{T_{\text{ITOF}}} \approx (\alpha_{AT} - \alpha_{BT})\Delta T + \frac{1}{2}(\eta_{AT} - \eta_{BT})(\Delta T)^2.$$

Coupled realization may be represented by:

$$\Delta X_A(E_1, E_2)|_{T_{\text{ITOF}}} \neq \Delta X_A(E_1) + \Delta X_A(E_2)|_{T_{\text{ITOF}}}.$$

A coupled residual may be represented by:

$$\delta^{\text{coupled}}_{A|B}\Big|_{T_{\text{ITOF}}} \sim (a_{A12} - a_{B12})E_1E_2 + \cdots .$$

All auxiliary domain residuals remain physical-realization residuals:

$$\delta^{\text{domain}}_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

A.11 Coefficient and Grounding Relations

A first-order response descriptor may be written as:

$$a_{Ai} = \frac{\partial F_A}{\partial E_i}\Big|_{(\Theta_A, \mathcal{E}_{A0})}.$$

A second-order response descriptor may be written as:

$$a_{Aij} = \frac{\partial^2 F_A}{\partial E_i \partial E_j}\Big|_{(\Theta_A, \mathcal{E}_{A0})}.$$

A possible interaction-level grounding pathway is:

$$H_A(\Theta_A, \mathcal{E}_A) \to \Delta E_k \to \Delta X_A \to R_{A|B} \to \delta_{A|B}.$$

A secondary decomposition may be used when needed:

$$H_A = H_{0,A}(\Theta_A) + H_{\text{int},A}(\mathcal{E}_A).$$

This decomposition is not foundational. It is a domain-specific grounding tool.

A.12 Relativistic Reassignment

The relativistic temporal assignment is:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

The ITOF assignment is:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B).$$

with:

$$T_A = T_B = T_{\text{ITOF}}.$$

Therefore:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

A.13 Geometry

Operational measurable geometry is denoted by:

$$G_{\text{meas}}.$$

Within ITOF:

$$G_{\text{meas}} \in O_{\text{phys}},$$

$$G_{\text{meas}} \neq T_{\text{ITOF}},$$

and:

$$G_{\text{meas}} \neq A_{\text{phys}}.$$

Geometry organizes measurable relations. It does not establish temporal deformation.

A.14 Minimal Equation Set

The minimal final equation set is:

$$T_{\text{ITOF}} = (S, \prec),$$

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\},$$

$$\Delta X_A|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\delta_{A|B}\Big|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B),$$

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

B. Logical Dependency Map of the Framework

This appendix summarizes the logical dependency structure of the framework. It does not introduce new theoretical content. Its purpose is to show how the main equations depend on one another and how they lead to the central temporal closure.

B.1 First Layer: Temporal Ontology

The framework begins with the definition:

$$T_{\text{ITOF}} = (S, \prec).$$

This relation defines time as invariant ordered succession. It does not define time as measurable duration, accumulated physical change, dynamical flow, physical substance, or deformable temporal entity.

The first layer therefore establishes:

$$\text{time} = \text{invariant ordered succession.}$$

B.2 Second Layer: Observable Physical Difference

Observable physical evolution is represented by:

$$X : S \to \mathbb{R},$$

and:

$$\Delta X_{ij} = X(S_j) - X(S_i).$$

The distinction between ordered succession and measurable physical difference is:

$$S_i \prec S_j \neq \Delta X_{ij}.$$

Thus:

$$\text{ordered succession} \neq \text{measurable physical evolution.}$$

This layer prevents the identification of time with change.

B.3 Third Layer: Observable Domain Separation

The observable physical domain contains measurable physical quantities:

$$\Delta X,\ R_{A|B},\ \delta_{A|B} \in O_{\text{phys}}.$$

Temporal ontology does not belong to the observable physical domain:

$$T_{\text{ITOF}} \notin O_{\text{phys}}.$$

This layer prevents the direct identification of a measured residual with measured deformation of time.

B.4 Fourth Layer: Absence of Physical Agency

Temporal ordering does not possess physical agency:

$$(S, \prec) \not\Rightarrow A_{\text{phys}}.$$

Physical influences possess influence-character:

$$E_i = E_i(\Pi_i).$$

Time does not belong to the class of physical influences:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

Therefore:

$$\Delta X_A \neq F_A(\Theta_A, T_{\text{ITOF}}).$$

This layer prevents the treatment of time as a dynamical input to physical realization.

B.5 Fifth Layer: Aggregated Influence Realization

Physical influences may aggregate into a realized influence profile:

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}\big(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n)\big).$$

The ordered extension $\mathcal{O}$ provides an observational domain. It does not act as a physical influence:

$$\mathcal{O} \not\Rightarrow A_{\text{phys}}.$$

This layer identifies the physical influence-side of realization without assigning agency to ordered succession.

B.6 Sixth Layer: Response Organization

The response-structure of a system is represented by:

$$\Theta_A.$$

At the foundational level:

$$\Theta_A \equiv \text{the physical structure of system } A \text{ as response organization.}$$

Thus, system structure and response organization are not separate foundations. They are one physical meaning within Θ_A.

This layer identifies the system-side of realization.

B.7 Seventh Layer: Physical Realization Under Invariant Ordering

Measurable realization is represented by:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

This equation depends on the previous layers:

$$T_{\mathrm{ITOF}} = (S, \prec),$$

$$T_{\mathrm{ITOF}} \notin \{E_i(\Pi_i)\},$$

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}(\mathcal{O}, E_1(\Pi_1), \ldots, E_n(\Pi_n)),$$

and:

$$\Theta_A \equiv \text{response-structure.}$$

This layer establishes the central positive assignment: measurable evolution is physical realization under invariant temporal ordering.

B.8 Eighth Layer: Comparative Residual Structure

For two systems:

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A),$$

$$\Delta X_B|_{T_{\mathrm{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B).$$

The comparative ratio is:

$$R_{A|B} = \frac{\Delta X_A}{\Delta X_B}.$$

The residual is:

$$\delta_{A|B} = R_{A|B} - 1.$$

Substitution gives:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A)}{F_B(\Theta_B, \mathcal{E}_B)} - 1.$$

Equivalently:

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

This layer assigns residuals to physical realization.

B.9 Ninth Layer: Temporal Closure

Since residuals belong to observable physical realization and not to temporal ontology:

$$\delta_{A|B} \in O_{\mathrm{phys}},$$

while:

$$T_{\mathrm{ITOF}} \notin O_{\mathrm{phys}},$$

the central closure follows:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

This is the core result of the framework.

B.10 Tenth Layer: Experimental Constraint

In controlled tests, influence profiles and response-structure classes are constrained:

$$\{E_i(\Pi_i)\}^{\mathrm{test}} \to [\mathcal{E}_r]^{\mathrm{test}},$$

$$A \in [\Theta_k].$$

The tested residual is:

$$\delta^{\text{test}}_{A|B}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

A significant residual satisfies:

$$|\delta^{\text{test}}_{A|B}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}},$$

while a bounded or null residual satisfies:

$$|\delta^{\text{test}}_{A|B}|\Big|_{T_{\text{ITOF}}} \le \sigma_{\text{exp}}.$$

Both outcomes constrain physical realization. Neither outcome changes temporal ontology.

B.11 Eleventh Layer: Relativistic Reassignment

The relativistic temporal assignment is:

$$\Delta X_A \neq \Delta X_B \Rightarrow \Delta t_A \neq \Delta t_B.$$

The ITOF assignment is:

$$\Delta X_A \neq \Delta X_B|_{T_{\text{ITOF}}} \Rightarrow F_A(\Theta_A, \mathcal{E}_A) \neq F_B(\Theta_B, \mathcal{E}_B),$$

with:

$$T_A = T_B = T_{\text{ITOF}}.$$

Therefore:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

This layer states the framework's foundational alternative to relativistic temporal ontology.

B.12 Complete Logical Chain

The complete dependency chain may be summarized as:

$$T_{\text{ITOF}} = (S, \prec)$$

$$\Downarrow$$

$$S_i \prec S_j \neq \Delta X_{ij}$$

$$\Downarrow$$

$$T_{\mathrm{ITOF}} \notin O_{\mathrm{phys}}$$

$$\Downarrow$$

$$T_{\mathrm{ITOF}} \notin \{E_i(\Pi_i)\}$$

$$\Downarrow$$

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A)$$

$$\Downarrow$$

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B)$$

$$\Downarrow$$

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

B.13 Compressed Dependency Statement

The framework may be compressed into the following dependency statement:

$$\boxed{T_{\mathrm{ITOF}} = (S, \prec) \Rightarrow T_{\mathrm{ITOF}} \notin \{E_i(\Pi_i)\} \Rightarrow \Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A) \Rightarrow \delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

This chain gives the logical spine of ITOF. Each later equation depends on the earlier distinction between invariant temporal ordering and measurable physical realization. No residual, coefficient, geometry, or relativistic correction is allowed to override that distinction unless time itself is first shown to possess physical influence-character.

C. Experimental Reference Protocol

This appendix provides a compact experimental reference protocol for applying the residual architecture of ITOF. It does not introduce new theoretical assumptions. Its purpose is to organize how a controlled experiment should identify systems, constrain influence profiles, measure physical realization, compute residuals, and interpret the result under invariant temporal ordering.

C.1 Step 1: Define the Temporal Condition

All experimental comparisons are evaluated under the invariant temporal ontology:

$$T_{\mathrm{ITOF}} = (S, \prec).$$

The experiment does not test whether different systems possess different temporal ontologies. It tests whether different systems realize measurable physical evolution differently under constrained physical conditions.

Thus:

$$T_A = T_B = T_{\mathrm{ITOF}}.$$

The experimental target is therefore not:

$$\delta T_{\mathrm{ITOF}},$$

but:

$$\delta^{\mathrm{test}}_{A|B}.$$

C.2 Step 2: Select the Measurable Observable

Choose an observable physical quantity:

$$X : S \to \mathbb{R}.$$

The measured evolution of system A is:

$$\Delta X^{\mathrm{test}}_A = X_A(S_j) - X_A(S_i).$$

The measured evolution of system B is:

$$\Delta X_B^{\text{test}} = X_B(S_j) - X_B(S_i).$$

These quantities belong to the observable physical domain:

$$\Delta X_A^{\text{test}}, \Delta X_B^{\text{test}} \in O_{\text{phys}}.$$

They are not direct measurements of temporal ontology.

C.3 Step 3: Classify the Response Structures

The tested systems are assigned to response-structure classes:

$$A \in [\Theta_k], \qquad B \in [\Theta_m].$$

If:

$$k = m,$$

the systems are treated as belonging to the same broad response-structure class.

If:

$$k \neq m,$$

the systems are treated as belonging to different response-structure classes.

This classification is not a biological, material, or taxonomic expansion for its own sake. It is used only to determine whether residual convergence or divergence should be expected under comparable influence profiles.

C.4 Step 4: Constrain the Influence Profile

Physical influences are represented by:

$$E_i = E_i(\Pi_i).$$

A controlled experiment constrains the relevant influence profile:

$$\{E_i(\Pi_i)\}^{\text{test}} \to [\mathcal{E}_r]^{\text{test}}.$$

For two systems, the tested influence profiles may be:

$$\mathcal{E}_A^{\text{test}} \in [\mathcal{E}_r]^{\text{test}},$$

$$\mathcal{E}_B^{\text{test}} \in [\mathcal{E}_s]^{\text{test}}.$$

If:

$$r = s,$$

the influence profiles are treated as comparable within the tested class.

If:

$$r \neq s,$$

the influence profiles are treated as different tested influence-profile classes.

C.5 Step 5: Apply the Realization Relation

For system A:

$$\Delta X_A^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A^{\text{test}}).$$

For system B:

$$\Delta X_B^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B^{\text{test}}).$$

These equations state that the measured outputs are physical realizations under invariant ordered succession. The temporal condition is shared; it is not a variable inside the realization functions.

C.6 Step 6: Compute the Comparative Ratio

The comparative ratio is:

$$R_{A|B}^{\text{test}} = \frac{\Delta X_A^{\text{test}}}{\Delta X_B^{\text{test}}}.$$

The residual deviation is:

$$\delta_{A|B}^{\text{test}} = R_{A|B}^{\text{test}} - 1.$$

Equivalently:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \frac{F_A(\Theta_A, \mathcal{E}_A^{\text{test}})}{F_B(\Theta_B, \mathcal{E}_B^{\text{test}})} - 1.$$

C.7 Step 7: Assign the Residual

The class-level assignment is:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

This equation determines the interpretive location of the residual. The residual is assigned to response-structure class, influence-profile class, or both. It is not assigned directly to time.

C.8 Step 8: Interpret Same-Class Convergence

If:

$$A, B \in [\Theta_k],$$

and:

$$\mathcal{E}_A^{\text{test}}, \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_r]^{\text{test}},$$

then the expected result is approximate convergence:

$$\Delta X_A^{\text{test}} \approx \Delta X_B^{\text{test}}\Big|_{T_{\text{ITOF}}}.$$

The residual is expected to be bounded:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}},$$

provided intra-class variation is below experimental sensitivity.

C.9 Step 9: Interpret Different-Class Divergence

If:

$$A \in [\Theta_k], \qquad B \in [\Theta_m], \qquad k \neq m,$$

while:

$$\mathcal{E}_A^{\text{test}}, \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_r]^{\text{test}},$$

then a significant residual is interpreted as response-class divergence:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}\right).$$

If:

$$\left|\delta_{A|B}^{\text{test}}\right|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}},$$

then the residual is experimentally significant. The interpretation remains physical:

$$\delta_{A|B}^{\text{test}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

C.10 Step 10: Interpret Influence-Profile Divergence

If:

$$A, B \in [\Theta_k],$$

but:

$$\mathcal{E}_A^{\text{test}} \in [\mathcal{E}_r]^{\text{test}}, \qquad \mathcal{E}_B^{\text{test}} \in [\mathcal{E}_s]^{\text{test}}, \qquad r \neq s,$$

then the residual is interpreted as influence-profile divergence:

$$\delta_{A|B}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Again:

$$\delta_{A|B}^{\text{test}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

C.11 Step 11: Compare Prediction and Observation

The predicted residual is:

$$\delta_{\text{pred}}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Empirical adequacy requires:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \leq \sigma_{\text{exp}}.$$

A failure of this inequality constrains the physical-realization model, the classification, the coefficients, or the influence mapping. It does not by itself imply temporal deformation.

C.12 Step 12: Apply the Temporal Closure

Every experimental interpretation must close with:

$$\boxed{\delta_{A|B}^{\text{test}} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.}$$

and:

$$\boxed{|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}} \not\Rightarrow T_{\text{ITOF}} \in O_{\text{phys}}.}$$

A nonzero residual indicates differential physical realization. A bounded residual constrains measurable divergence. Neither result changes the ontological status of time.

C.13 Compact Experimental Protocol

The experimental protocol may be summarized as:

$$T_{\text{ITOF}} = (S, \prec)$$

$$\Downarrow$$

$$A \in [\Theta_k], \qquad B \in [\Theta_m]$$

$$\Downarrow$$

$$\{E_i(\Pi_i)\}^{\text{test}} \to [\mathcal{E}_r]^{\text{test}}$$

$$\Downarrow$$

$$\Delta X_A^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A^{\text{test}})$$

$$\Delta X_B^{\text{test}}\Big|_{T_{\text{ITOF}}} = F_B(\Theta_B, \mathcal{E}_B^{\text{test}})$$

$$\Downarrow$$

$$\delta_{A|B}^{\text{test}} = \frac{\Delta X_A^{\text{test}}}{\Delta X_B^{\text{test}}} - 1$$

$$\Downarrow$$

$$\delta^{\text{test}}_{A|B}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right)$$

$$\Downarrow$$

$$\delta^{\text{test}}_{A|B} \neq 0 \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

This protocol defines the experimental use of the framework. It tells the investigator what to classify, what to constrain, what to measure, how to compute the residual, and how to interpret the result without converting measured physical asymmetry into temporal deformation.

D. Constraint and Challenge Reference Conditions

This appendix summarizes the principal conditions that would constrain or challenge the framework. It does not introduce new assumptions. Its purpose is to state, in compact form, what kind of evidence would affect the ITOF assignment of measured asymmetry to physical realization rather than temporal deformation.

D.1 Challenge to the Influence-Character Exclusion Principle

ITOF asserts that time does not possess influence-character:

$$T_{\text{ITOF}} \notin \{E_i(\Pi_i)\}.$$

A direct challenge would require showing that temporal ordering itself belongs to the class of physical influences:

$$T_{\text{ITOF}} \in \{E_i(\Pi_i)\}.$$

This would require evidence that time itself possesses physical action-properties such as intensity, direction, energetic transfer, interaction channel, coupling capacity, field behavior, propagation structure, or another physically operative influence-character.

Equivalently, time does not carry the constitutive properties by which physical influences act. It is the invariant ordering structure within which physical realization becomes distinguishable, not a physical factor producing that realization. A measured difference between systems is not sufficient for this challenge. The required evidence would have to show that time itself acts as a physical influence.

D.2 Challenge to Physical-Realization Residual Assignment

ITOF assigns residual structure to response-structure and realized influence profile:

$$\delta_{A|B}\Big|_{T_{\text{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

A challenge would require showing that residuals are independent of these physical-realization variables:

$$\delta_{A|B} \text{ does not depend on } (\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

Such a result would weaken the physical-realization assignment. However, a residual unexplained by a current incomplete model does not by itself establish temporal deformation. It first indicates that the response-structure classification, influence-profile mapping, coefficient extraction, or domain model requires refinement.

D.3 Challenge from Controlled Predictive Failure

In a controlled domain, the predicted residual is represented by:

$$\delta_{\text{pred}}^{\text{test}}\Big|_{T_{\text{ITOF}}} = \delta\left([\Theta_k], [\Theta_m]; [\mathcal{E}_r]^{\text{test}}, [\mathcal{E}_s]^{\text{test}}\right).$$

Empirical adequacy requires:

$$\left|\delta_{\text{pred}}^{\text{test}} - \delta_{\text{obs}}^{\text{test}}\right| \leq \sigma_{\text{exp}}.$$

A controlled predictive challenge would occur if:

$$\left|\delta_{\text{obs}}^{\text{test}} - \delta_{\text{pred}}^{\text{test}}\right| > \sigma_{\text{exp}} + \epsilon_{\text{model}},$$

after the response-structure classes, influence-profile classes, relevant coefficients, and model-error allowance have been independently constrained.

This condition would constrain the physical-realization model. It would not immediately prove temporal deformation unless the physical-realization variables had been systematically exhausted as explanatory sources.

D.4 Operational Success Is Not Ontological Necessity

ITOF accepts that a measurement structure may be operationally successful. However, operational success alone does not determine temporal ontology:

$$\text{operational success} \not\Rightarrow \text{unique temporal ontology}.$$

More specifically:

$$\text{successful relativistic correction} \not\Rightarrow \delta T_{\text{ITOF}} \neq 0.$$

A geometrical or relativistic formalism may organize measured relations effectively. That effectiveness does not, by itself, prove that time is a deformable physical entity. To challenge ITOF, the argument must show that the observed relations require temporal deformation and cannot be assigned to physical realization under invariant ordered succession.

D.5 Significant Residuals and Null Residuals

A significant residual is represented by:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} > \sigma_{\text{exp}}.$$

This indicates experimentally significant differential physical realization. It does not imply:

$$\delta T_{\text{ITOF}} \neq 0.$$

A bounded or null residual is represented by:

$$|\delta_{A|B}^{\text{test}}|\Big|_{T_{\text{ITOF}}} \leq \sigma_{\text{exp}}.$$

This constrains the magnitude of differential realization within the tested domain. It does not imply that temporal ontology has become observable, nor does it affect the definition:

$$T_{\text{ITOF}} = (S, \prec).$$

Thus, both significant and null results remain physical-realization results.

D.6 Summary of Challenge Conditions

The main challenge conditions may be summarized as:

$$\boxed{T_{\text{ITOF}} \in \{E_i(\Pi_i)\}}$$

would challenge the claim that time has no influence-character.

$$\boxed{\delta_{A|B} \text{ does not depend on } (\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B)}$$

would challenge the physical-realization assignment of residuals.

$$\boxed{\left|\delta_{\text{obs}}^{\text{test}} - \delta_{\text{pred}}^{\text{test}}\right| > \sigma_{\text{exp}} + \epsilon_{\text{model}}}$$

would constrain the predictive realization model in a controlled domain.

$$\boxed{\text{operational success} \not\Rightarrow \text{unique temporal ontology}}$$

prevents the inference from empirical usefulness alone to deformable time.

D.7 Final Constraint Closure

The framework is therefore constrained by empirical and conceptual evidence, but the evidence must target the correct level. Measured asymmetry alone is not enough. Operational success alone is not enough. Model incompleteness alone is not enough.

The central closure remains:

$$\boxed{\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.}$$

A genuine challenge must either show that time itself has physical influence-character, or show that measured residuals cannot be assigned to response-structure and realized influence profiles after those variables have been independently constrained.

E. Transition from V14 to the Present V15 Formulation

The present formulation does not abandon the V14 realization architecture. It refines it. V14 established the assignment of measurable residuals to structure-dependent physical realization within invariant ordered succession. The present V15 formulation sharpens that assignment by distinguishing physical influence-character, aggregated influence profiles, response-structure classes, and residual reassignment under invariant temporal ordering.

The transition may be summarized as:

$$\Delta X_A = F_A(\Theta_A, E_1, E_2, \ldots, E_n)$$

$$\Downarrow$$

$$E_i = E_i(\Pi_i)$$

$$\Downarrow$$

$$\mathcal{E}_A = \mathcal{L}_{\mathcal{E}}(\mathcal{O}, E_1(\Pi_1), E_2(\Pi_2), \ldots, E_n(\Pi_n))$$

$$\Downarrow$$

$$\Delta X_A|_{T_{\mathrm{ITOF}}} = F_A(\Theta_A, \mathcal{E}_A).$$

The residual transition is:

$$\delta_{A|B} = \delta(\Theta_A, \Theta_B, E_1, E_2, \ldots, E_n)$$

$$\Downarrow$$

$$\delta_{A|B}\Big|_{T_{\mathrm{ITOF}}} = \delta(\Theta_A, \Theta_B, \mathcal{E}_A, \mathcal{E}_B).$$

The temporal closure remains unchanged:

$$\delta_{A|B} \neq 0 \not\Rightarrow \delta T_{\mathrm{ITOF}} \neq 0.$$

Thus, the present formulation should be read as a refinement and deepening of the V14 realization architecture, not as a replacement of its core temporal ontology. V14 established the structure-dependent realization direction; the present formulation gives that direction a sharper influence-profile architecture and a more explicit reassignment of relativistic measured asymmetry.

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