

The UAT/UCP Descriptive Reality Equation

A Perceptual Metric for Observable Information
Through the Causal Fabric
— Conceptual Framework Note

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Abstract

This document presents the unified perceptual metric of the Unified Applicable Time (UAT) and Unified Causal Principle (UCP) framework. It contains no new results; it synthesizes previously published constants and relationships into a single equation for communication and pedagogical purposes. All component factors are derived and validated in the referenced technical papers. The equation describes how an observer perceives an event through successive layers of the causal fabric —cosmological expansion, gravitational time dilation, quantum gravitational diffusion, 8-phase interference amplification, causal coherence limits, and the thermodynamic cost of maintaining the arrow of time— requiring exactly one free parameter: the 7% thermal calibration margin.

1 The Descriptive Reality Equation

The UAT/UCP framework does not describe how a system evolves in time. It describes how an observer **perceives** an event through the causal fabric that separates the event from the observation. The fundamental perceptual metric is:

$$\mathcal{R}_{\text{obs}} = \mathcal{R}_0 \times \underbrace{\frac{1}{a(t)}}_{\text{Expansion}} \times \underbrace{\frac{1}{\sqrt{1 - \frac{2GM}{c^2 r}}}}_{\text{Gravity}} \times \underbrace{\frac{1}{1 + \frac{\gamma l_{\text{Planck}}^2}{4\pi r_s^2}}}_{\text{Quantum}} \times \underbrace{\varphi}_{\text{Interference}} \times \underbrace{\kappa_{\text{crit}}}_{\text{Coherence}} \times \underbrace{(1 - \varepsilon)}_{\text{Efficiency}} \quad (1)$$

where $\mathcal{R}_0$ is the intrinsic reality of the event — what “is” — and $\mathcal{R}_{\text{obs}}$ is the reality perceived by a distant observer.

1.1 The Component Factors

Table 1: The seven factors of the UAT/UCP perceptual metric.

Factor	Symbol	Value	Physical Meaning
Intrinsic reality	$\mathcal{R}_0$	—	The event as it is, before any perceptual
Cosmological expansion	$1/a(t)$	—	Stretches the perceived signal with the s
Gravitational dilation	$(1 - 2GM/c^2r)^{-1/2}$	—	Time slows near mass; the event appears
Quantum diffusion (LQG)	$(1 + \gamma l_P^2/4\pi r_s^2)^{-1}$	—	Spacetime foam blurs the signal at the P
8-phase interference	φ	1.618034	Golden ratio: constructive interference a
Causal coherence limit	κ_{crit}	4.978	Ivancho limit: maximum sustainable coh
Causal efficiency	$(1 - \varepsilon)$	0.967	What survives the 3.3% overflow per cyc

(Note: The causal efficiency is derived from the Quantum Brake constant $k_{\text{early}} = 0.967$, yielding an overflow parameter $\varepsilon = 1 - k_{\text{early}} \approx 0.033$.)

1.2 The Question Each Factor Answers

Table 2: The physical question answered by each factor in the perceptual metric.

Factor	Question It Answers
$1/a(t)$	How much did the universe stretch since the event occurred?
Gravitational	How much did gravity slow the event's clock?
Quantum (LQG)	How much did spacetime foam blur the signal?
φ	How much did 8-phase interference amplify the information?
κ_{crit}	What is the maximum coherence the universe can sustain?
$(1 - \varepsilon)$	How much of each cycle is spent keeping time flowing forward?

2 Physical Interpretation

In words, the UAT/UCP Descriptive Reality Equation states:

The reality you perceive is not the reality that occurs. It is the reality that occurs, stretched by the expansion of the universe, slowed by gravity, blurred by quantum foam, amplified by 8-phase interference, bounded by what the causal fabric can sustain, and reduced by what is expended to maintain the arrow of time. All together. All at once. All with a single free parameter: the 7% thermal noise margin that prevents the system from collapsing.

This is not a field theory. It is not a Lagrangian. It is a **perceptual metric**. Reality is not absolute — it is applicable.

2.1 The Role of the 7% Thermal Margin

In a static perceptual metric, information saturation would rupture the buffers of reality. The 7% thermal calibration margin ($\phi_*/\eta = 0.07$) is not a measurement error in the interferometers — it is the *vital pulse*, the necessary asymmetry that allows the system to breathe and the causal fabric to sustain amplification without disintegrating. Without this margin ($\varepsilon = 0$), the universe would be a frozen, deterministic block. With a margin exceeding $\sim 20\%$, structures could not form. The 7% value lies at the center of the anthropically permitted window.

3 Conceptual Remarks

The following observations are offered as conceptual commentary on the architecture of the perceptual metric, not as new technical results.

The Relativistic-Quantum Bridge: By multiplying the gravitational dilation factor $(1 - 2GM/c^2r)^{-1/2}$ by the Loop Quantum Gravity correction $(1 + \gamma l_{\text{Planck}}^2/4\pi r_s^2)^{-1}$, the framework integrates macro-reality and micro-reality into a single attenuation chain. The original event $\mathcal{R}_0$ simultaneously suffers the slowing of gravity and the blurring of quantum foam.

The Interference-Coherence Tension: The interplay between φ (the geometric amplification produced by constructive interference of the 8 phase fronts) and $\kappa_{\text{crit}} = 4.978$ is the exact mathematical representation of the coherence limit: how much information density the causal fabric can sustain before triggering Thermodynamic Overdrive.

The Toll of Time: The term $(1-\varepsilon)$, anchored in the Quantum Brake constant $k_{\text{early}} = 0.967$, demonstrates that the flow of reality is not free; a structural thermodynamic cost —the remaining $\sim 3.3\%$ per cycle— is consumed exclusively to maintain the directionality of the arrow of time, surviving the causal overflow.

The Meaning of the 7%: The thermal calibration margin is not a measurement artifact. In a static perceptual metric, information saturation would rupture the buffers of reality. That margin is the vital asymmetry that allows the system to breathe and the causal fabric to sustain amplification without disintegrating.

The conclusion is mathematically inevitable under this framework: **reality is not absolute, it is applicable.**

4 Summary

The UAT/UCP Descriptive Reality Equation (Eq. 1) provides a unified perceptual metric for observable information. Its seven factors span cosmology, general relativity, quantum gravity, geometric interference, causal coherence, and thermodynamics. The framework requires exactly one free parameter —the 7% thermal calibration margin— constrained by the existence of cosmic structures. It describes not how the universe evolves, but how an observer perceives it.

*Reality is not absolute.
Reality is applicable.*

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