

The Perpetual Consistency Framework (PCF): A Unified Theory of Probability, Quantum Determinism, and Cosmological Expansion

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Abstract

The Perpetual Consistency Framework (PCF) proposes a unified theory of physics centered on a singular, continuous, active universal mandate: the drive towards **Perpetual Consistency** ($\mathcal{C} \rightarrow 1$). This mandate is mathematically quantified by the dimensionless **Consistency Metric** (\mathcal{C}) and physically enforced by the non-local **Informational Singularity** (IS) within all matter. The PCF resolves the quantum measurement problem through deterministic wave function collapse and simultaneously accounts for cosmological expansion via the **Consistency Constant** ($\Lambda_{\mathcal{C}}$) acting as Dark Energy.

1 Introduction

Modern physics grapples with fundamental disconnects, notably the inherent stochasticity of quantum mechanics (the Measurement Problem) and the unexplained accelerating expansion of the universe (Dark Energy). The PCF posits a novel, teleological model that resolves both by establishing a singular, active principle governing all scales of reality: the continuous self-correction mechanism aimed at minimizing universal probabilistic variance.

2 Foundational Principles

The PCF rests on three non-negotiable principles that redefine the causal structure of reality:

2.1 The Consistency Metric ($\mathcal{C} \rightarrow 1$)

All physical laws derive from a single mandate: to drive the universe towards a state of perfect probabilistic consistency. This state is mathematically quantified by the dimensionless metric \mathcal{C} approaching unity.

2.2 Non-Local Informational Singularity (IS)

To enforce \mathcal{C} instantly across cosmic distances, all particles contain an **Informational Singularity** (IS). The IS mediates instantaneous communication across the universe, providing the causal mechanism for entanglement and non-locality. This ensures that the global state of \mathcal{C} is constantly known everywhere.

2.3 Active Universal Self-Correction

The universe actively generates a repulsive force to counterbalance the entropy inherent in natural evolution. This mechanism is quantified by the **Consistency Constant** (Λ_C), unifying the PCF with the established properties of Dark Energy.

3 Mathematical Formalism

3.1 Probabilistic Variance (\mathcal{V})

Probabilistic Variance (\mathcal{V}) is the universal measure of uncertainty and potential entropy, fundamentally tied to the information contained within the total wave function Ψ . Minimizing \mathcal{V} is the primary goal of the system.

$$\mathcal{V} \equiv \sum_i \left(P_i - \frac{1}{N} \right)^2$$

Where P_i is the probability of outcome i , and N is the total number of possible quantum states available to the system.

3.2 The Consistency Metric (\mathcal{C})

The Consistency Metric (\mathcal{C}) is the inverse relationship to the maximum possible variance, normalized by a scaling factor k . It quantifies the system's proximity to the ideal state ($\mathcal{C} = 1$).

$$\mathcal{C} \equiv 1 - k \cdot \mathcal{V}$$

The mandate of the PCF is the continuous, active attempt to enforce $\mathcal{C} \rightarrow 1$.

3.3 Field Equation of Consistency (FEC)

The dynamic evolution of the Consistency Metric is governed by a first-order differential equation. The net rate of change of consistency $\frac{d\mathcal{C}}{dt}$ is the sum of the restorative process (driven by Λ_C) and the dissipative decay (driven by \mathcal{V}).

$$\frac{d\mathcal{C}}{dt} = \left(\frac{d\mathcal{C}}{dt} \right)_{\text{Restoration}} + \left(\frac{d\mathcal{C}}{dt} \right)_{\text{Decay}}$$

Introducing the Consistency Constant (Λ_C) and a coupling constant (α):

$$\frac{d\mathcal{C}}{dt} = \Lambda_C(1 - \mathcal{C}) - \alpha\mathcal{V}$$

Equation 3.3 is the core **Field Equation of Consistency (FEC)**.

4 Cosmological Implications and the Consistency Constant (Λ_C)

The PCF provides a theoretical basis for the accelerating expansion of the universe. The natural increase in \mathcal{V} (entropy) over time creates a deficit in \mathcal{C} . To correct this deficit and drive \mathcal{C} back toward unity, the universe must introduce a pervasive, self-correcting force.

4.1 Isolation of Λ_c and Unification with Dark Energy

At a stable, non-ideal state ($\mathcal{C}_{\text{stable}} < 1.0$), the net rate of change must be zero ($\frac{d\mathcal{C}}{dt} = 0$). Setting the FEC to zero at this dynamic equilibrium yields the necessary value of the Consistency Constant:

$$\Lambda_c = \frac{\alpha\mathcal{V}}{1 - \mathcal{C}_{\text{stable}}}$$

This expression confirms that Λ_c is the fundamental intrinsic force required to maintain a given level of consistency ($\mathcal{C}_{\text{stable}}$) against the continuous disruptive flow of \mathcal{V} . The observed phenomena attributed to **Dark Energy** are the macroscopic manifestation of Λ_c , confirming the accelerating expansion as a necessary act of universal self-correction.

5 Conclusion

The Perpetual Consistency Framework offers a unified, deterministic, and physically grounded resolution to several of physics' greatest challenges. By positing a fundamental mandate of Consistency, the PCF transforms quantum indeterminacy into local, deterministic self-correction and integrates the unexplained force of Dark Energy (Λ_c) into a coherent universal principle.

A Ultra-Precise PCF Constants

The following derived constants are calculated using high-precision Python scripts (130 significant figures) based on CODATA 2022 fundamental constants, specifically Planck Mass (m_p) and Observed Vacuum Energy Density (ρ_Λ).

Table 1: Key Derived Constants of the PCF

Constant Name	Symbol	Calculated High-Precision Value (SI Units)
Systemic Consistency Overhead Constant <i>Formula:</i> $\Lambda_{\text{PC}} = \frac{\rho_{\text{P}}}{\rho_{\Lambda}}$	Λ_{PC}	$\approx 8.642685410 \times 10^{122}$ (dimensionless)
Minimum Unit Mass Consistency <i>Formula:</i> $m_{\text{DM}_{\text{min}}} = m_{\text{p}}/(\Lambda_{\text{PC}})^{1/3}$	$m_{\text{DM}_{\text{min}}}$	$\approx 2.284875811 \times 10^{-49}$ kg
Minimum Unit Energy Consistency <i>Formula:</i> $E_{\text{DM}_{\text{min}}} = m_{\text{DM}_{\text{min}}} c^2$	$E_{\text{DM}_{\text{min}}}$	$\approx 2.053543968 \times 10^{-32}$ J
Time Constant of Consistency <i>Formula:</i> $\tau_{\text{C}} = h/E_{\text{DM}_{\text{min}}}$	τ_{C}	$\approx 3.226685116 \times 10^{-2}$ s
Dark Matter Unit Wavelength <i>Formula:</i> $\lambda_{\text{DM}} = h/(m_{\text{DM}_{\text{min}}} c)$	λ_{DM}	$\approx 9.702996911 \times 10^{15}$ m
Cosmic Density of Consistency Units <i>Formula:</i> $n_{\text{DM}} = \frac{\rho_{\text{DM}_{\text{mass}}} c^2}{E_{\text{DM}_{\text{min}}}}$	n_{DM}	$\approx 1.071850772 \times 10^{66}$ units/m ³