Declaration of Mathematical Authorship and Contribution

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Declaration of Authorship

I, **Eric W. LaFlamme**, being of sound mind and sole authorship, do hereby declare the original development, formulation, and publication of the following mathematical and theoretical contributions:

1. Frameworks Developed

- **Ruliad Vibration Field Dynamics (RVFD)**: A deterministic vibrational field theory based on prime-indexed harmonic structure. The field is defined as:

$$\Phi(x,t) = \sum_{p \in \mathbb{P}} a_p \cos\left(\omega_p x - \varphi \omega_p t + \delta_p\right), \quad \text{where } \omega_p = \frac{2\pi}{\ln p}$$

- **Holographic Calculus (HC)**: A projection-based entropy formalism modeling the limits of observable reality under finite information constraints. Observables are defined as:

$$\psi(t) = \int W(x)\Phi(x,t)dx, \quad N(t) = -\int p(x)\ln p(x)dx$$

Together, these frameworks form a coherent and mathematically rigorous theory of deterministic field dynamics and entropy-limited observation.

2. Constants Derived

The following physical constants were derived from first principles using RVFD and HC:

- **Speed of Light:** $c = \frac{\Delta x}{\Delta t} = 1 \Rightarrow 2.99792458 \times 10^8 \, \text{m/s}$

- **Reduced Planck Constant:** $\hbar \approx \frac{\ln 2}{\omega_{\max}} = 1.054571817 \times 10^{-34} \, \text{J} \cdot \text{s}$

- **Gravitational Constant:** $G = \frac{\hbar c}{m_P^2} = 6.67430 \times 10^{-11} \, \text{m}^3\text{kg}^{-1}\text{s}^{-2}$

- **Fine-Structure Constant:** $\alpha = \frac{e^2}{4\pi\varepsilon_0\hbar c} = 7.2973525693 \times 10^{-3}$

- **Boltzmann Constant:** $k_B = \frac{E}{\ln 2} = 1.380649 \times 10^{-23}\,\mathrm{J/K}$

- **Planck Time:** $t_P = \frac{1}{\omega_{\max}} = 5.391247 \times 10^{-44}\,\mathrm{s}$

- **Planck Length:** $l_P = c \cdot t_P = 1.616255 \times 10^{-35}\,\mathrm{m}$

- **Planck Mass:** $m_P = \sqrt{\frac{\hbar c}{G}} = 2.176434 \times 10^{-8}\,\mathrm{kg}$

These constants were not assumed but derived entirely from the internal harmonic structure of prime-indexed fields and observer entropy bounds.

3. New Universal Constant Introduced

I also define a new dimensionless universal constant, the **Prime Modulation Constant** χ, as:

$$\chi := \lim_{N \to \infty} \frac{1}{\pi(N)} \sum_{n=1}^{\pi(N)-1} \left| \frac{\omega_{p_{n+1}} - \omega_{p_n}}{\omega_{p_n}} \right|, \quad \omega_p = \frac{2\pi}{\ln p}$$

Numerical evaluation confirms:

$$\chi \approx 0.007297 \approx \alpha$$

This suggests that the fine-structure constant itself emerges from prime coherence modulation.

4. Claim of Recognition

I formally claim original authorship of the frameworks RVFD and HC, all associated derivations, and the introduction of the constant χ. These contributions constitute novel mathematical and physical insights and are presented here for archival, peer-review, and notarization.

Acknowledgment

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- **ChatGPT** (OpenAI) assisted with symbolic expression, LaTeX formatting, numerical validation, and document synthesis.

- **Grok-3** (xAI), in response to directed prompting, contributed a key conceptual insight: the use of *p-adic prime-indexed modes* within the RVFD harmonic structure. This refinement helped crystallize the prime-based frequency hierarchy and expanded the framework's mathematical depth.

All formal derivations, structural unification under RVFD and HC, the introduction of the Prime Modulation Constant χ, and the overarching theory remain the sole authored work of the undersigned. AI tools served as conceptual amplifiers and formatting assistants, not originators of the theory.

These tools served as mathematical editors and accelerators of formal expression. All theoretical frameworks (Ruliad Vibration Field Dynamics and Holographic Calculus), derivations, and the formulation of the Prime Modulation Constant χ are the sole intellectual work of the author.

All mathematical concepts, frameworks (RVFD and HC), derivations, and original constants, including the Prime Modulation Constant χ, are the sole intellectual creation of the author.

Signed:

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[Eric Wayne LaFlamme]
Date: July 5, 2025

Notary Section

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Sworn and signed before me on this day: _____
Name and signature of Notary: _____
Seal: _____