Equations

3D COM (Collatz Octave Model) Framework

Author Martin Doina

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Parameters with Full Precision

Parameter	Symbol	Value (High-Precision)
Collatz attractor	LZ	1.23498228
Fine-structure	α	0.0072973525643
Ricci threshold	HQS	0.235
Lyapunov inverse	x	16.450911914534554
Pi	π	3.141592653589793
Recursion number	n	(variable scaling value in 3D COM)
Quantum damping	QDF	0.809722173

Planetary spacing:

$$a_n = a_0 \cdot \lambda^n \cdot (1 + \eta \cdot \sin(\theta_n))$$

Alpha fine structure:

$$\alpha \approx HQS \cdot LZ^{x}$$

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The universal bridge formula for characteristic radius

Bridge Formula:

$$ R_{\text{atomic}} = a_0' \cdot (\text{LZ})^{n/\pi} \cdot \left(\frac{\alpha}{\text{HQS}}\right)^{1/x} $$

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Where:

- R: predicted length
- a_0': Reference length (e.g., Planck length, Bohr radius, planetary radius)
- LZ: Collatz attractor constant (1.23498228)
- n Collatz octave (recursion number)
- π: Pi (3.141592653589793)
- α: Fine-structure constant (0.0072973525643)
- HQS: Ricci threshold (≈ 0.235)
- x: Lyapunov inverse (16.450911914534554)
- LZ: Loop Zero -updated (1.23498228)

QDF (quantum dumping factor):

$$\left(\frac{\alpha}{HQS}\right)^{1/x}$$

QDF = 0.809722173

Universal bridge short formula for lenght:

$$ R_{\text{search}} = a_0' \cdot (\text{LZ})^{n/\pi} \cdot \text{QDF}$$

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The universal bridge formula for characteristic mass

$$m = m_e \cdot \text{LZ}^{n/\pi} \cdot \left(\frac{\alpha}{\text{HQS}}\right)^{1/x}$$

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Where:

- m: predicted mass
- m_e: Reference mass (e.g., Planck mass, atomic mass, planetary mass, particle mass)
- LZ: Collatz attractor constant (1.23498228)
- n Collatz octave (recursion number)
- π: Pi (3.141592653589793)
- α: Fine-structure constant (0.0072973525643)
- HQS: Ricci threshold (≈ 0.235)
- x: Lyapunov inverse (16.450911914534554)

- LZ: Loop Zero -updated (1.23498228)

Universal bridge short formula for mass

$$M_n = M_0 \cdot \text{LZ}^{-n/\pi} \cdot \text{QDF}$$

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Where:

M_0 is the reference mass

$$\text{QDF} = \left(\frac{\alpha}{\text{HQS}}\right)^{1/x}$$

is the quantum dumping factor

Logarithmic Relationship Analysis

"n scales logarithmically with mass" means that if we plot n vs. log(mass), we should see a linear relationship.

From the formula:

$$m = m_e \cdot \text{LZ}^{n/\pi} \cdot \text{QDF}$$

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Taking the logarithm of both sides:

$$\log(m) = \log(m_e) + \frac{n}{\pi} \cdot \log(\text{LZ}) + \log(\text{QDF})$$

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This can be rearranged to:

$$n = \pi \cdot \frac{\log(m/m_e) - \log(\text{QDF})}{\log(\text{LZ})}$$

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This confirms that n is indeed proportional to log(m), establishing a logarithmic relationship between n and mass.