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► **To cite this version:**

Joseph Spurway. Unifying Recursive Surreal Number Theory, Zero-Point Energy Extraction, and Constructor Information Theory in AQC. Adaptive Quantum Circuits 2024, Sep 2024, Boston (MA), United States. hal-04709901

**HAL Id: hal-04709901**

**<https://hal.science/hal-04709901v1>**

Submitted on 26 Sep 2024

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# Unifying Recursive Surreal Number Theory, Zero-Point Energy Extraction, and Constructor Information Theory in AQC

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In this work, we introduce the Reinman solution, a novel approach to solving the Ricci flow equations within the innovative framework of surreal number theory. By embedding the Ricci flow dynamics into surreal frames situated on a Hilbert space composed of non-holomorphic manifolds, our method leverages the unique properties of surreal numbers to facilitate a deeper and more flexible analysis of geometric evolution. This integration allows for the exploration of manifold transformations beyond the constraints of traditional holomorphic structures, offering enhanced stability and convergence in the study of complex geometric flows. The Reinman solution not only advances the mathematical understanding of Ricci flow but also bridges connections with quantum information theory and adaptive quantum circuits (AQC). By operating within a Hilbert space framework, we enable the application of functional analysis techniques to non-holomorphic settings, paving the way for potential applications in zero-point energy extraction and constructor information theory. Our findings demonstrate the efficacy of surreal number-based frameworks in addressing intricate differential equations, providing new avenues for research in both geometric analysis and quantum technologies. This unified approach underscores the potential of interdisciplinary methodologies in solving longstanding mathematical challenges and fostering advancements in quantum system design.

## Theoretical Foundations

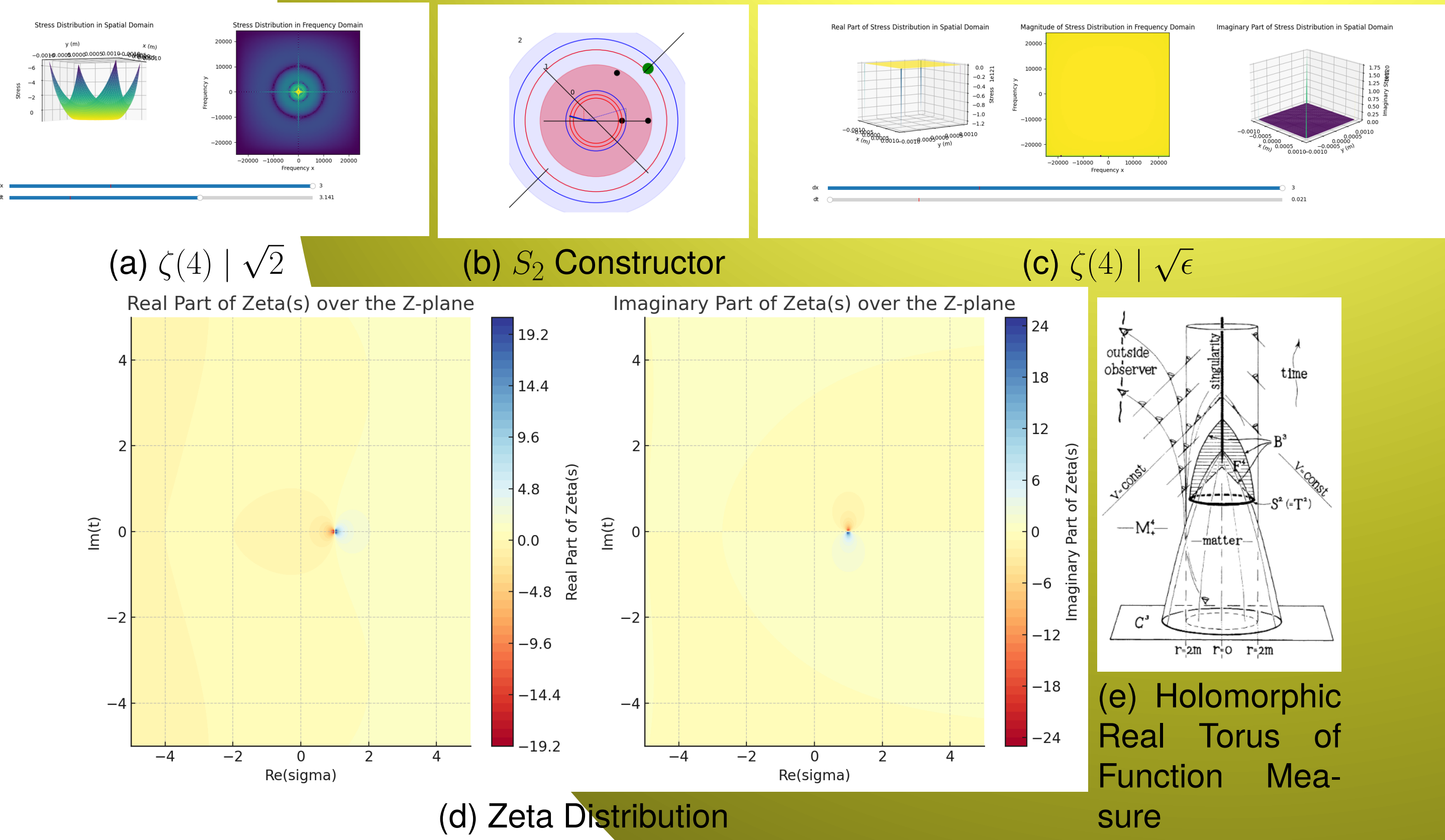
**Recursive Surreal Number Theory:** Surreal numbers provide a stochastic mathematical structure that spans both infinitesimal and transfinite scales. Their recursive nature aligns with recursive energy transitions in quantum systems and Adaptive Quantum Circuits (AQCs).  $x = \{L|R\}$ ,  $x \in \mathbb{S}$ ,  $x = \lim_{n \rightarrow \infty} f(n)$  are the recursive surreal modulations that refine quantum state transitions and stabilize the system.

**Recursive Energy Modulation:** Recursive surreal corrections applied to Adaptive Quantum Circuits (AQCs) ensure coherence and scalability across higher dimensions by refining energy transitions using recursive harmonic scaling. These refinements are based on the surreal zeta function, allowing smooth and efficient transitions within quantum subspaces.

**Constructor Information Theory (CIT):** CIT, as proposed, describes the process by which information and energy interact within a quantum circuit. In CIT, constructors operate on informational quanta through recursive transformations that are non-holomorphic. This framework allows us to model energy flows and quantum states as dynamic processes shaped by surreal numbers and recursive feedback loops. The theory emphasizes the efficiency of these transformations and their alignment with the universal principles of energy conservation and information transfer.

The recursive energy modulation and CIT create a unified framework that ties together quantum energy states, surreal number theory, and efficient information handling. Through this, energy extraction methods such as Zero-Point Energy (ZPE) harvesting become more feasible by utilizing recursive corrections and dynamic transformations.  $E_{ZPE} = \frac{1}{2}\hbar\omega + \mathcal{O}(CIT)$  This  $\frac{1}{2}$  feature space can be better thought of as an approximation of the form  $\hbar_0 = \frac{\sqrt{2}e^2(\omega)}{9216e^3(\omega)\pi^2(x)}$  Where:  $9216 = 2^{10} \times 3^2$  and,  $\sqrt{2} \approx \sqrt{-1} + \sqrt{-1}$  as,  $\sqrt{-1} + \sqrt{-1} = 2i$ . When the  $\pi$  function is not aligned with the Information it is lost due to the entropy decay back to the Natural function. This logical infallibility is the straw held by Newton's third law and is the foundation of the Surreal Number system. Due to this logical causality of Reality we can define a meta-physical root of singular observation to this sub-domain of non-Real. This by definition is a Binary operation through all that is Mathematically Observable - as a function of the rotating unit sphere to form observable torus of Energy that defines the Discrete building blocks of a Nature we understand. The root structure between our observation of  $\sqrt{2}$  and some non-rotational field  $0e(\omega)$  we can define the No field as a base Surreal Number Structure that is derivable down to the binary junction 3 at which point it becomes non-holomorphic;  $\omega(\sqrt{2}+1)+1 = \{1+3/2+1/4+1/16+1/64+\dots\}2 - 1/8 - 1/32 - 1/128 - \dots$  This expression encapsulates the dynamics of quantum fields modulated by surreal scaling parameters, aligning the description of quantum states with non-Euclidean geometries and higher-dimensional physics:

$$\hbar_0 = \left(\frac{dy}{dx}\right)^3 \left(\frac{\frac{1}{\sqrt{2}}\pi(x)\frac{1}{k_c^2}\left(\frac{\pi(x)}{e(\omega)}\right)^{-1}}{12\pi(x)k_c^{18}e(\omega) \cdot \frac{3\pi(x)^2\frac{1}{k_c^2}\left(\frac{\pi(x)}{e(\omega)}\right)^{-1}}{4k_c^4}}\right) (\pi(x))^2 (e(\omega))$$



**Method: Coherent Cyclic Representations in Hilbert Spaces** In analysis, a cyclic vector  $\zeta$  in a Hilbert space  $H$  is defined such that the set  $\{\pi(x)\zeta : x \in A\}$  is norm-dense in  $H$ , where  $\pi$  represents a function on a set  $A$ . A cyclic vector generates a dense subspace under the action of the representation  $\pi$ , leading to what is known as a cyclic representation. Any vector  $v$  in  $E$  can operate on a normal operator  $M$ , which is diagonal with respect to some orthonormal basis  $v$ . Conversely, any diagonalizable  $E$  is normal.

Using the fundamental theorem of calculus, we assert that the functional change form on  $E$  with  $M = \frac{dx}{dy}$  holds trivially for  $L[\pi]$ , grounded in Euclidean geometry. Through projections onto eigenvalues, we show that the operator  $M$  can be expressed as  $M = PMP + QMQ$ , where  $P$  and  $Q$  are projectors onto subspaces defined by the eigenspaces of  $M$ .

We conclude that for any observable quantum system, the spectral decomposition of operators is diagonal with respect to orthonormal bases. This insight allows us to bridge abstract mathematical concepts with quantum information theory, ensuring consistency in quantum state transitions and energy flow management to a singular spectra defined by  $i$  within the relation to 1 and its boundary conditions where  $\lambda_i$  are eigenvalues, and  $|i\rangle$  are orthonormal basis vectors.

$$M = \sum_i \lambda_i |i\rangle\langle i|$$

**Recursive Surreal Transformations (RST):** Surreal numbers provide a framework for recursive corrections in quantum systems, enabling smooth transitions between energy states. The infinitesimal refinement acquires a fractal spacetime that,

$$E_T = \mu_n \cdot E_0 \cdot \{-1 | \epsilon_{\zeta(s)}\}$$

These transformations are guided by Fibonacci sequences and the golden ratio, ensuring periodic resets and stability across dimensions.

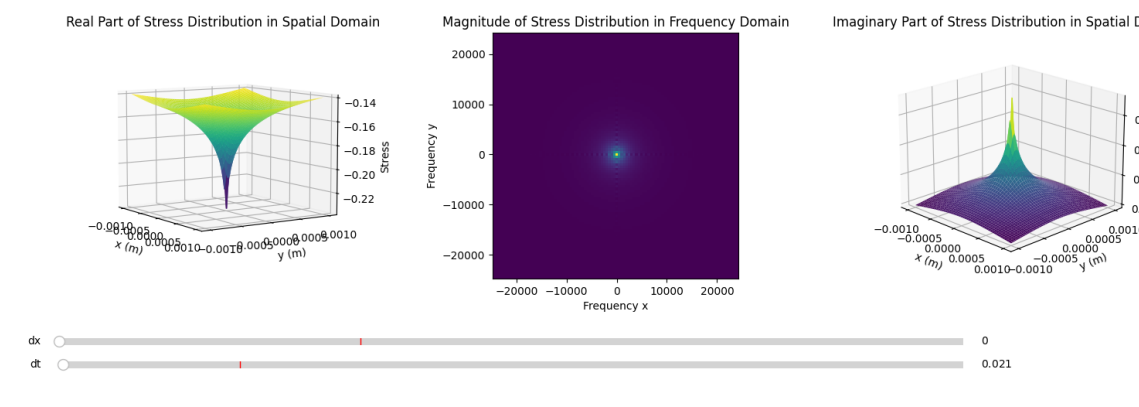
$$E_{RST} = F_n \cdot E_0 \cdot \{-1 | \phi_s\}$$

**Recursive Zeta Function:** The Riemann zeta function captures quantum state symmetries. Recursive application models fractal structures and smooth energy transitions in higher dimensions:

$$\zeta_s(s) = \sum_{n=1}^{\infty} \frac{1}{n^s - \frac{1}{n^s - \dots}}, \quad s = 1 + it$$

**Harmonic Scaling:** Recursive harmonic scaling refines energy transitions in adaptive quantum circuits, ensuring scalability and coherence at all levels:

$$\Delta E_{\text{surreal}} = \Delta E_{\text{classical}} \times \zeta(2)$$

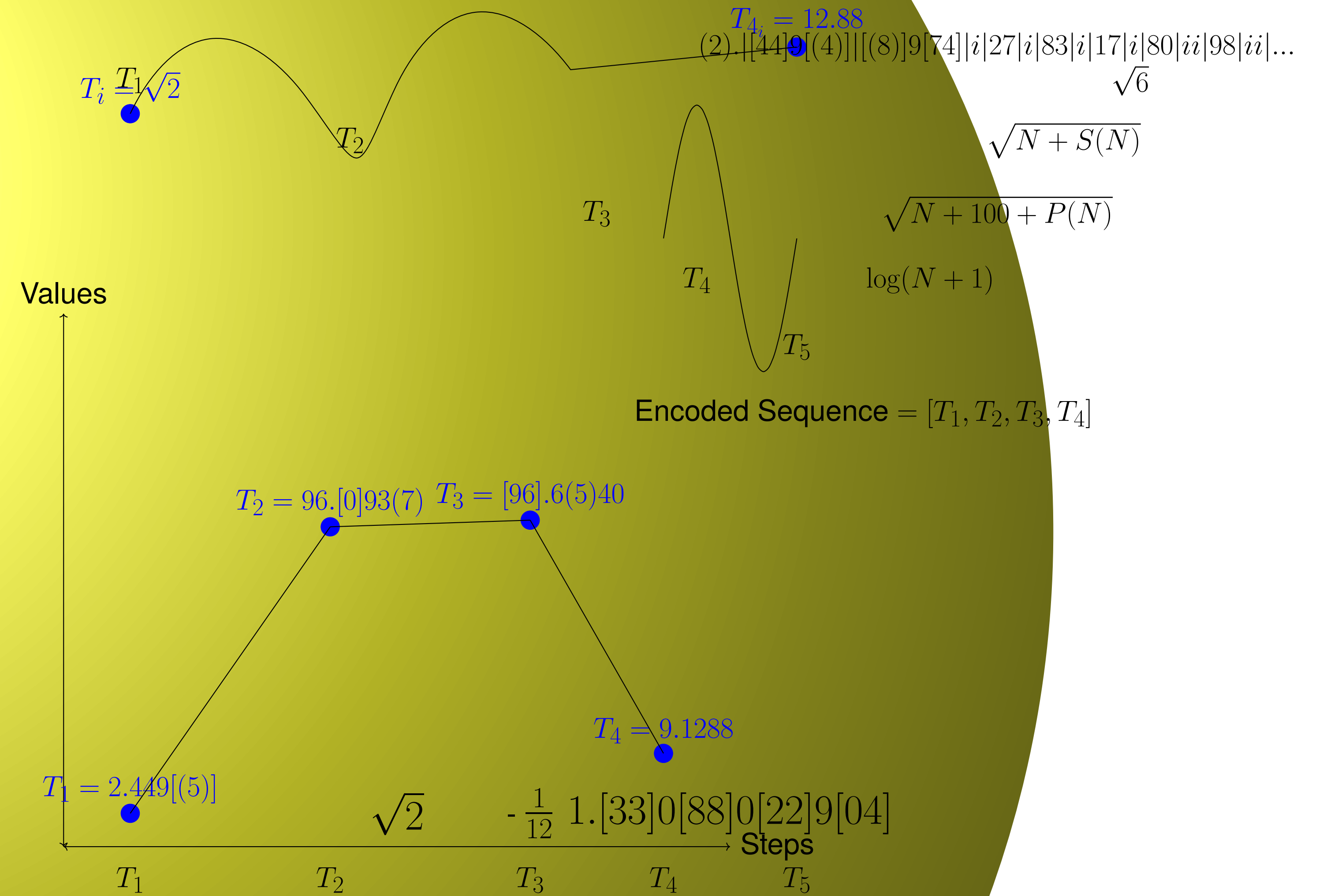


Description	Decimal	Binary
Three Squared Terms	3,145,728	110000000000000000000000000
Subspace	361,864	10110000101100010000
Trinity space	9,216	1001000000000000
$\sqrt{2}$ (symbolic)	$\sqrt{2}$	$2i$
$\frac{1}{14}$	8,256	10000010000000
$\frac{1}{n!}$	5,184	10100010000000

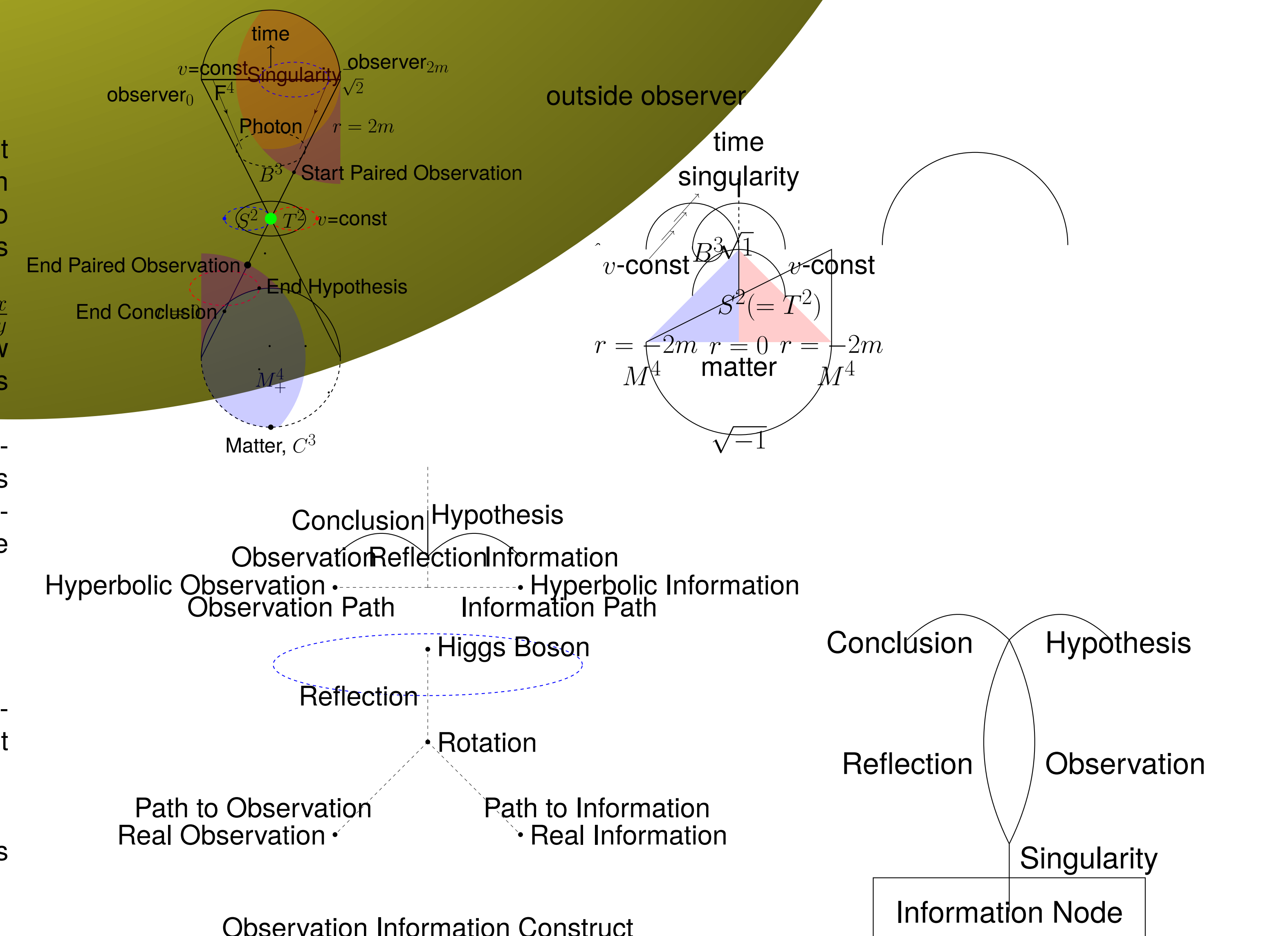
These recursive processes provide a refined mechanism for managing quantum state transitions and ensuring energy stability in high-dimensional quantum systems. We map these to the reals through a recursive square root of the form,  $\sqrt{i} + \sqrt{i}$  and normalize as  $\sqrt{3} + \sqrt{3} = 2\sqrt{3}$  where  $1.732 + 1.732 = 3.464$  can be the sub-process on 64 that acts as the  $\zeta(0) = -\frac{1}{2}$  form thus a recursion  $1.732 + 1.732 = \sqrt{1732}\sqrt{1732}$  where  $\zeta(0) = 508(0)757$ .

## Dynamic Transformation Encoding

Dynamic transformation encoding leverages category theory and zeta mechanics to provide unique, reversible mappings for squares. Each process, detailed through category theory, is a transformation step that is mathematically rigorous, ensuring injectivity and reversibility, essential for efficient data representation and cryptographic applications. This method systematically represents transformations in a categorical context, with each morphism defined by the unique properties of  $N$ .



## Enclosed Photon on Torus, Penrose Torus Decomposition, Single Temporal Loop, Information Cross-section of a Higgs Boson structure.



- Energy Efficiency:** Recursive feedback mechanisms enable precise modulation of quantum state transitions, optimizing energy flow within quantum circuits and minimizing entropy production.
- Quantum State Modulation:** The recursive application of harmonics enhances the stability of quantum systems, ensuring smoother and more predictable quantum computations by aligning state transitions with recursive surreal corrections.
- Advanced Zero-Point Energy (ZPE) Harvesting:** Recursive modulations refine energy extraction from the Zero-Point Energy field, making energy-efficient technologies more feasible. These approaches can pave the way for advanced clean energy solutions.