The Single Field Theory: The Neutrinic Lattice, Quantum Coherence, and the Structure of Space-Time

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Abstract

The Single Field Theory (SFT) proposes a unified view of space-time as a quantized lattice composed of neutrino–antineutrino pairs, forming the fundamental fabric of existence. This lattice, structured geometrically in tetrahedral configurations, represents the discrete nature of reality, where coherence and decoherence define the propagation of energy, matter, and information. The theory integrates concepts of zitterbewegung, entanglement, and quantum coherence to describe black holes, gravity, and electromagnetic phenomena within a single coherent framework.

1. The Neutrinic Lattice as Quantized Space-Time

In the Single Field Theory, the fabric of space-time is not continuous but composed of discrete, self-organizing cells — each defined by a pair of counter-rotating spheres, representing the neutrino and antineutrino. These dual spheres embody the dynamic balance of the electromagnetic field through the orthogonal coupling of electric and magnetic components. Each pair forms a complete unit of quantized space, a 'pixel' of reality (Figure 1 — The neutrinic double-sphere cell). The tetrahedral arrangement of these cells ensures no gaps in space, creating a fully quantized continuum.

2. Coherence and Decoherence as the Engine of Propagation

Propagation within the neutrinic lattice occurs through successive alternations of coherence and decoherence. Each transition represents the oscillation between locality and non-locality, coherence and entanglement, giving rise to what we observe as motion and causality. This alternation happens at a fixed rate, corresponding to the speed of light, 'c', which thus emerges as the fundamental constant of coherence propagation in the lattice.

3. The Electromagnetic Genesis of the Neutrino

The neutrino arises from the harmonic coupling of orthogonal electric and magnetic oscillations, phase-shifted by ninety degrees. This configuration creates a spinning electromagnetic standing wave — a self-contained field structure that manifests as the photon/electron duality within the neutrinic cell. A counter-rotating configuration produces the antiphoton/positron pair, and together they form the complete neutrino–antineutrino system, bridging bosonic and fermionic domains geometrically.

4. Black Holes as Quantum Coherence Condensates

In this model, black holes are seen as macroscopic coherence phenomena — vast regions where the neutrinic lattice achieves a perfectly synchronized quantum state. Analogous to a Bose–Einstein condensate, the black hole represents a region of maximum coherence, where the distinction between individual cells vanishes, and the field behaves as a single unified entity. The event horizon thus marks the boundary between coherent and semi-coherent lattice domains. This view resonates with recent research on rapidly spinning black holes limiting the existence of ultralight bosons, suggesting that coherence constrains field configurations at quantum-gravitational scales.

5. The Dual Limits of the Universe

The structure of space-time defined by the Single Field Theory has two asymptotic states: at one extreme, the black hole represents total coherence (absence of entropy and matter), and at the other, the quantum vacuum represents total decoherence, where energy manifests as zitterbewegung — the continuous creation and annihilation of gamma photons and electron–positron pairs. Both extremes define the boundaries of physical existence, with the observable universe existing in dynamic equilibrium between them.

6. Discussion: Entanglement, Locality, and the Zitterbewegung

Entanglement in this framework is interpreted geometrically: the connection between distant neutrinic cells within the lattice preserves coherence through phase symmetry rather than signal transmission. Locality arises only in states of partial coherence, where the field behaves discretely. The zitterbewegung represents the local oscillation of this coherence, a microscopic echo of the universe's constant negotiation between unity and multiplicity.

7. Conclusions and Future Perspectives

The Single Field Theory offers a coherent vision where gravity, electromagnetism, and quantum phenomena emerge from the same underlying process — the dynamic coherence of the neutrinic lattice. Future work will focus on formalizing the mathematical structure of coherence gradients, simulating the lattice numerically, and exploring experimental analogs in photonic and Bose–Einstein systems.

References

Dirac, P. A. M. (1938). Classical theory of radiating electrons. *Proceedings of the Royal Society A, 167*(929), 148–169.

Einstein, A., Podolsky, B., & Rosen, N. (1935). Can quantum-mechanical description of physical reality be considered complete? *Physical Review, 47*(10), 777–780.

Physics World (2025). Rapidly spinning black holes put new limit on ultralight bosons. Retrieved from https://physicsworld.com/

Gravitational–Electromagnetic Coupling in the Neutrinic Lattice Geometry

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1. Introduction

In the framework of the *Single Field Theory* (SFT), space-time is represented as a fully quantized lattice composed of neutrinic cells. Each cell consists of two counter-rotating electromagnetic spheres — photon/electron and antiphoton/positron — forming a geometrically coherent structure. The dynamic equilibrium of these double-sphere units defines the local curvature and coherence of the space-time lattice.

2. Gravitational–Electromagnetic Coupling

Within this geometric framework, gravity and electromagnetism are not independent interactions but complementary manifestations of the same underlying field dynamics. Gravitational waves correspond to collective oscillations of the neutrinic lattice — large-scale coherent deformations of its geometric order. Electromagnetic waves, instead, represent local torsional oscillations of individual cells.

Energy exchange between the two fields can occur when the coherence frequency of a gravitational perturbation matches the resonance modes of the electromagnetic standing waves within the lattice. This resonance condition allows the conversion of gravitational energy into electromagnetic energy, or vice versa, depending on local phase alignment and coherence density.

3. Quantum Coherence and the Neutrinic Lattice

At the microscopic level, the coupling mechanism relies on successive alternations of coherence and decoherence within adjacent neutrinic cells — a process that propagates through the lattice at the fixed speed *c*. This propagation does not imply motion through space, but a sequential phase reorganization of local states, analogous to a chain of coherence transfer.

In this sense, gravitational–electromagnetic interaction is a *phase communication* across the quantum vacuum — a dynamic entanglement extending over the geometry of the reticular space-time.

4. Conceptual Summary

Gravitational and electromagnetic phenomena appear as two complementary limits of the same coherent field structure.

- In the **gravitational regime**, large-scale coherence dominates, minimizing local torsion and defining curvature.
- In the **electromagnetic regime**, localized oscillations of the lattice prevail, generating quantized energy states.
  The dynamic transition between these regimes, governed by resonance and coherence, can thus explain phenomena such as the conversion of gravitational energy near rapidly spinning black holes into electromagnetic radiation — a macroscopic expression of the underlying neutrinic lattice dynamics.

Gravitational Analogs of Quantum Phenomena and the Single Field Theory Framework

Recent research in quantum gravity has begun to explore the possibility that gravitational systems may exhibit *quantum analogs* of well-known condensed-matter effects. As discussed by Buchanan (2024) in *Physics* magazine, new theoretical models suggest that gravitational versions of phenomena such as the **quantum Hall effect** or the **Josephson effect** could, in principle, exist under certain extreme conditions. These effects would represent macroscopic manifestations of gravitational quantization—an idea that directly resonates with the **Single Field Theory (SFT)** framework.

Within SFT, the **neutrinic lattice** quantizes space-time into coherent cells, each representing a unit of energy and structure. Gravitational waves, in this view, are *collective oscillations* of this lattice, while electromagnetic waves are *localized excitations*. The emergence of gravitational analogs to quantum effects implies that the same coherence principles governing electrons in condensed matter could also govern the geometric oscillations of the neutrinic lattice itself.

From this perspective, the proposed gravitational quantum effects can be seen as **macroscopic coherence phenomena** of the underlying quantized geometry of space-time. If realized experimentally, they would validate one of the core predictions of the Single Field Theory — namely, that **gravity and electromagnetism are not distinct interactions**, but rather **different coherent modes of the same fundamental field**.

Moreover, such effects may provide a path toward measuring the *coherence threshold* ρ_c of the neutrinic lattice, defining the critical conditions under which the geometry of space-time transitions from classical curvature to quantum coherence. This connection establishes a bridge between gravitational physics and quantum field phenomena, suggesting that what we call "quantum gravity" is simply a manifestation of **field self-coherence within the structured space-time fabric**.

(Reference: Buchanan, M. (2024). Gravitational versions of quantum experiments. Physics, 17, 179. American Physical Society.)

"A rapidly spinning black holes put new limit on ultralight bosons"
And
the *Single Field Theory (SFT)*.

1. Introduction and Context

Recent astrophysical observations of rapidly spinning black holes have placed new constraints on the existence of ultralight bosons — hypothetical particles predicted by extensions of the Standard Model and string theory. These constraints arise from the absence of expected superradiant effects, which would have extracted angular momentum from the black holes if such bosonic fields existed.

In the conventional framework, superradiance occurs when a bosonic field with a Compton wavelength comparable to the black hole's gravitational radius interacts with its rotation, leading to the amplification of the field and a gradual spin-down of the black hole. The observed stability of high-spin black holes, therefore, sets upper limits on the mass of these ultralight bosons, typically around $m_b \lesssim 10^{-13}\ \mathrm{eV}/c^2$.

The *Single Field Theory (SFT)* offers an alternative geometric interpretation of these phenomena. In this framework, space-time is not a continuous, empty manifold, but a discrete, quantized lattice composed of *neutrinic cells* — each a dynamic tetragonal (or tetrahedral) structure. These fundamental space-time elements are formed by the coherent coupling of photon/antiphoton and electron/positron pairs, generating the neutrino–antineutrino dual system.

Within this structure, energy, matter, and space-time curvature are manifestations of the same fundamental field, represented through varying degrees of coherence and decoherence among the neutrinic lattice cells. Consequently, black holes and other extreme astrophysical objects can be interpreted not as singularities in the metric, but as macroscopic regions of *quantum coherence* within the space-time lattice — analogous to Bose–Einstein condensates at the cosmological scale.

This perspective provides a natural explanation for the observed absence of superradiant effects: in a fully coherent region of the lattice, decoherent modes (such as those associated with ultralight bosons) cannot propagate. Thus, the stability of rapidly rotating black holes reflects the underlying coherence threshold of the quantum space-time fabric itself.

2. The Structure of the Neutrinic Lattice

In the SFT framework, space-time is built upon a dynamic *neutrinic lattice*, where each elementary cell represents a self-contained oscillating structure combining the electromagnetic and matter aspects of reality.

2.1. The Tetrahedral Cell Geometry

The fundamental cell of space-time is modeled as a *dynamic tetrahedron*, not as a static geometric figure but as a standing wave configuration. Each vertex represents a local polarization of the field

— an electron/positron or photon/antiphoton pair — in continuous rotation and counter-rotation. These oscillations embody the dual aspects of the quantum field:

- **Electric and magnetic harmonic motions**, orthogonal and phase-shifted by 90°,
- **Zitterbewegung**, corresponding to the intrinsic trembling motion of the field within each cell,
- **Entanglement**, representing the coherence link between neighboring cells through shared tetrahedral edges and faces.

The tetrahedral geometry ensures that no gaps exist between cells: the entire structure forms a *quantized, gapless fabric* — the true physical foundation of what is conventionally called the "quantum vacuum."

2.2. Coherence, Decoherence, and Propagation

The dynamic balance between coherence and decoherence across adjacent cells gives rise to what we perceive as the propagation of fields and particles. In this model:

- **Coherence** corresponds to the collective alignment of oscillations among cells (analogous to a phase-locked quantum state).
- **Decoherence** corresponds to local disalignment, producing measurable phenomena such as particle interactions and wave dispersion.
- The alternation of coherence/decoherence propagates through the lattice at a constant rate, perceived as the invariant velocity c, the speed of light.

This mechanism naturally integrates *locality* and *non-locality*:

- Locality emerges within regions of stable coherence.
- Non-locality (quantum entanglement) arises from instantaneous correlations across coherent links in the lattice geometry.

2.3. Matter and Field as Lattice States

In the SFT framework:

- **Leptons** represent semi-coherent, localized configurations of the lattice.
- **Bosons** correspond to coherent, delocalized oscillations propagating through the structure.
- **Black holes** are the extreme limit of coherence — macroscopic condensations of the lattice where decoherence modes are fully suppressed.

This interpretation implies that the "vacuum" is not empty, but a dynamically structured medium capable of phase transitions between coherent and decoherent states. The classical gravitational field, in this sense, is not an external curvature of space-time but an *emergent modulation of lattice coherence*.

3. The Black Hole as a Coherent Condensate

In the framework of the *Single Field Theory (SFT)*, the black hole does not represent a singularity or a point of infinite curvature, but rather a **region of complete quantum coherence** within the neutrinic lattice. In this interpretation, the gravitational collapse of matter corresponds to a transition from a decoherent or semi-coherent region of space-time (ordinary matter and radiation) into a fully coherent condensate state of the lattice.

This process is analogous to the **Bose–Einstein condensation** observed in quantum systems, where a large number of particles occupy a single quantum state, losing individual identity and behaving as a unified macroscopic wavefunction.

3.1. Coherence as Gravitational Density

The gravitational field in this theory is reinterpreted as a **gradient of lattice coherence**, rather than a curvature of an abstract manifold. The degree of coherence $\rho_c$can be defined as a dimensionless function varying between 0 and 1, where:

- $\rho_c = 0$ represents total decoherence (maximal entropy, unstructured zitterbewegung),
- $\rho_c = 1$ represents total coherence (black hole state, maximal order).

In this view, the *gravitational potential* Φcan be expressed as an emergent property of the coherence field:

$$\nabla\Phi \propto \nabla\rho_c$$

Regions where coherence increases correspond to gravitational attraction — not due to a warping of space-time, but because the lattice tends to minimize decoherence gradients, drawing energy and matter into higher coherence density.

3.2. The Horizon as a Phase Boundary

The **event horizon** in this model is the **coherence–decoherence boundary** of the neutrinic lattice. At this interface:

- The oscillatory phase relationships between neighboring cells become locked, leading to a suppression of information exchange across the boundary (interpreted as the classical event horizon).
- The quantum phase of the lattice transitions sharply from the semi-coherent regime (where local causality exists) to the fully coherent regime (where locality breaks down).
- This transition explains why external observers cannot access information beyond the horizon: all oscillations are phase-synchronized and thus indistinguishable.

Mathematically, this can be viewed as a **coherence condensation**:

$$\lim_{\rho_c \to 1} \frac{\partial \rho_c}{\partial t} = 0$$

indicating that once the coherence field saturates, temporal evolution (and hence information flow) effectively ceases — consistent with the time-free interior of a classical black hole.

3.3. Quantum Coherence and Gamma Resonance

According to the SFT, the *frequency domain* associated with black hole coherence lies in the **gamma regime**, corresponding to extremely high oscillation frequencies of the lattice.
At these energy scales:

- The oscillatory motion of the photon/antiphoton and electron/positron pairs (that compose each neutrinic cell) becomes synchronized across macroscopic volumes.
- The entire structure behaves as a **gamma-frequency laser-like condensate** — a self-sustaining standing wave of pure coherence.
- The absence of lower-frequency decoherent modes (such as ultralight bosons) explains why observed rapidly spinning black holes do not lose angular momentum via superradiance: those modes cannot exist within a fully coherent region of the lattice.

Thus, the black hole represents the **upper coherence limit of the quantum vacuum**, while the zitterbewegung field — the high-entropy quantum noise of virtual particles — represents the **lower coherence limit**. Between these two extremes lies the structured, semi-coherent domain that gives rise to the observable universe.

3.4. A Unified Coherence Continuum

In summary:

- **Matter** arises from localized, semi-coherent structures within the neutrinic lattice.
- **Radiation** is the manifestation of coherent oscillations propagating through the lattice.
- **Gravitation** is the emergent effect of coherence gradients.
- **Black holes** are the ultimate coherent condensates — spacetime regions where the oscillatory field achieves complete phase alignment, eliminating decoherence and information diversity.

The concept of the black hole as a **macroscopic quantum coherence** unifies matter, energy, and spacetime under the same dynamic field structure. The observed astrophysical limits on ultralight bosons thus emerge naturally: they are coherence thresholds of the quantum lattice, not particle properties in isolation.

4. Superradiance and Bosonic Modes in the Neutrinic Lattice

4.1. The Standard Picture of Superradiance

In the conventional framework of general relativity and quantum field theory, **black hole superradiance** arises when a bosonic field interacts with the rotational energy of a Kerr black hole. If the boson's Compton wavelength $\lambda_b = h/(m_b c)$is comparable to the size of the black hole, the field can become trapped in orbit around it. Through this coupling, part of the black hole's rotational energy can be extracted, amplifying the field — much like a stimulated emission process.

This mechanism predicts that rapidly rotating black holes should lose angular momentum over cosmic timescales if light bosons exist. Observations, however, show many black holes maintaining extreme spin rates, implying that such bosonic modes — if they exist — must have masses below the detectable range, typically $m_b \lesssim 10^{-13}\ \mathrm{eV}/c^2$.

4.2. The SFT Interpretation: Coherence and Decoherence Modes

In the *Single Field Theory (SFT)*, the phenomenon of superradiance is reinterpreted as a **decoherence instability** of the neutrinic lattice surrounding a region of high coherence — such as a black hole.

Within the lattice, each cell (neutrino) represents a coupled photon/antiphoton–electron/positron oscillation, and the overall behavior of the lattice can be described as a spectrum of coherent and decoherent vibrational modes.

- **Coherent modes** correspond to stable, phase-synchronized oscillations of the lattice (e.g., light propagation, gravitational waves, or the internal state of a black hole).
- **Decoherent modes** represent local fluctuations that can disrupt this synchronization (e.g., matter formation, quantum noise, or ultralight boson-like excitations).

When a black hole reaches near-total coherence ($\rho_c \to 1$), the lattice enters a **phase-locked state**. In such a condition, decoherent oscillations cannot be sustained — the lattice behaves like a *perfect superconductor of phase*, in which phase disorder (entropy) is expelled.

Thus, **superradiance cannot occur** in the presence of full coherence, because the field modes that would extract angular momentum (the ultralight bosons) are dynamically suppressed by the coherence of the lattice itself.

4.3. The Coherence Threshold and the Boson Mass Limit

The observed upper bound on ultralight boson masses therefore corresponds, in SFT, to the **lowest allowable decoherence frequency** in the quantum lattice.
Below a critical frequency ν_c, decoherence cannot propagate — coherence dominates entirely.

This threshold can be written qualitatively as:

$$E_c = h\nu_c = m_c c^2$$

where $m_c$is the **coherence mass limit** — approximately equal to the upper limit observed for ultralight bosons ($\sim 10^{-13}$ eV/c^2).

This correspondence implies that the so-called "ultralight boson" is not an independent particle species, but rather a *lattice excitation mode* — the lowest-frequency decoherence vibration permissible in the quantum fabric of space-time.

The absence of superradiance, therefore, is not evidence of the non-existence of such particles, but of the **stability of coherence** within the space-time lattice surrounding rotating black holes.

4.4. Superradiance as Coherence Leakage

In this perspective, superradiance can be reinterpreted as a **leakage of coherence** from the condensate core (black hole) to the surrounding lattice.
The lack of observed superradiance suggests that:

1. The black hole's coherence is perfectly self-contained — analogous to a laser cavity in which all standing modes are internally trapped.
2. The surrounding lattice has a **high coherence impedance**, preventing the coupling of internal gamma-frequency modes with external decoherent (low-frequency) modes.

The ratio between the black hole's characteristic oscillation frequency (ν_{BH}, in the gamma regime) and the coherence threshold frequency (ν_c) determines the stability of the system:

$$\frac{\nu_{\mathrm{BH}}}{\nu_c} \gg 1 \Rightarrow \text{Stable coherent condensate (no superradiance)}$$

This explains why only extremely low-mass bosonic modes (well below 10^{-13} eV) could, in principle, induce decoherence — and why none have been observed.

4.5. Implications for Observational Physics

The SFT model predicts several testable consequences:

- The *absence* of black hole superradiance implies a *lower bound* on the coherence frequency of the quantum vacuum.
- The coherence threshold $E_c = h\nu_c$defines the lowest quantum of decoherence energy possible in space-time — a universal property of the vacuum, not a particle-specific one.
- Black hole spin distributions in different mass regimes could, in principle, reveal the *frequency structure of lattice coherence*, offering an indirect probe into the quantum fabric of space-time.

5. Conclusions and Future Perspectives

The *Single Field Theory (SFT)* provides a unified physical and geometric framework in which matter, energy, and the fabric of space-time arise from the dynamic organization of a quantized neutrinic lattice. In this model, every physical phenomenon — from the propagation of light to the formation of black holes — emerges from the local interplay of coherence and decoherence within the fundamental lattice of space-time cells.

Black holes, traditionally understood as regions of infinite density or curvature, are here reinterpreted as **macroscopic condensates of coherence**. Rather than representing a breakdown of physical law, they embody the *maximum possible order* of the quantum lattice — a state in which all oscillations of the photon/antiphoton–electron/positron pairs composing each cell are phase-locked into a unified oscillatory mode.

The event horizon thus emerges as a **coherence boundary**, separating the fully coherent condensate (non-local, timeless, and informationally complete) from the semi-coherent external universe (local, temporal, and informationally diverse). The impossibility of transmitting information across this boundary is not due to relativistic constraints, but to the complete synchronization of the lattice's internal phase — a physical barrier to decoherence.

This interpretation offers a natural explanation for the observed absence of **black hole superradiance** and the corresponding constraints on ultralight bosons. The *superradiant instability* predicted by classical quantum field theory requires the presence of low-frequency decoherence modes within or around the black hole. However, in the SFT framework, such modes cannot exist below a critical coherence threshold $E_c = h\nu_c$, corresponding to a mass limit of approximately $m_c \approx 10^{-13}\ \mathrm{eV}/c^2$.
Below this frequency, the lattice is fully coherent — incapable of sustaining independent, disordered oscillations. The observed astrophysical data therefore reflect not the absence of hypothetical bosons, but the **stability of quantum coherence** in the structure of space-time itself.

The implications of this perspective extend far beyond black hole physics. The SFT model suggests that:

- **Gravitation** is an emergent phenomenon arising from spatial gradients of lattice coherence.
- **Matter** and **radiation** correspond to different dynamic regimes of the same field: semi-coherent (localized) and coherent (delocalized), respectively.
- The **quantum vacuum** — often described as empty — is in fact a structured, quantized medium in dynamic equilibrium between coherence (order) and decoherence (fluctuation).

The two extremes of this spectrum define the ultimate boundaries of physical reality:

1. **Maximum Coherence (Black Hole State):** no matter, no time — only synchronized field dynamics.

2. **Maximum Decoherence (Quantum Entropy State):** complete zitterbewegung — continuous annihilation and recreation of virtual pairs, again with no matter.

Between these two extremes lies the *physical universe* as we experience it: a structured yet fluctuating lattice in perpetual oscillation between local order and global uncertainty — the living dynamic of coherence and decoherence that defines existence itself.

Future Directions

1. **Mathematical Formalization**
   Future work should express the coherence density $\rho_c$as a field variable, governed by a differential equation analogous to the Gross–Pitaevskii equation for Bose–Einstein condensates.

$$i\hbar\frac{\partial\Psi}{\partial t} = [-\frac{\hbar^2}{2m_v}\nabla^2 + V(\rho_c) + g \mid \Psi \mid^2]\Psi$$

   where Ψrepresents the coherence field of the neutrinic lattice, $m_v$is the effective mass of the neutrino cell, and $V(\rho_c)$defines the potential of coherence gradients.

2. **Numerical Simulation of Lattice Coherence**
   Simulation of tetrahedral lattice structures could visualize transitions between coherence, decoherence, and black hole states — providing a computational bridge between geometry and field dynamics.
3. **Observational Predictions**
   - The *spin stability* of black holes across mass ranges could trace the coherence spectrum of the vacuum.
   - A *cutoff frequency* for decoherence propagation might be observable in high-precision cosmological or gamma-ray background data.
   - Laboratory analogs using Bose–Einstein condensates or photonic lattices may replicate the coherence-decoherence transitions predicted by SFT.

Final Remark

In the *Single Field Theory*, the black hole is not an anomaly — it is the purest manifestation of the universe's foundational order.
Space-time itself, woven from the rhythmic coherence of the neutrinic lattice, is both the field and the geometry — the unity of matter, energy, and structure.
The observed astrophysical phenomena are thus not boundaries of understanding, but **signatures of a coherent universe**, where the dynamics of light, matter, and gravity all emerge from a single, self-organizing field.

Conceptual Analysis of the Image in the Context of the Single Field Theory

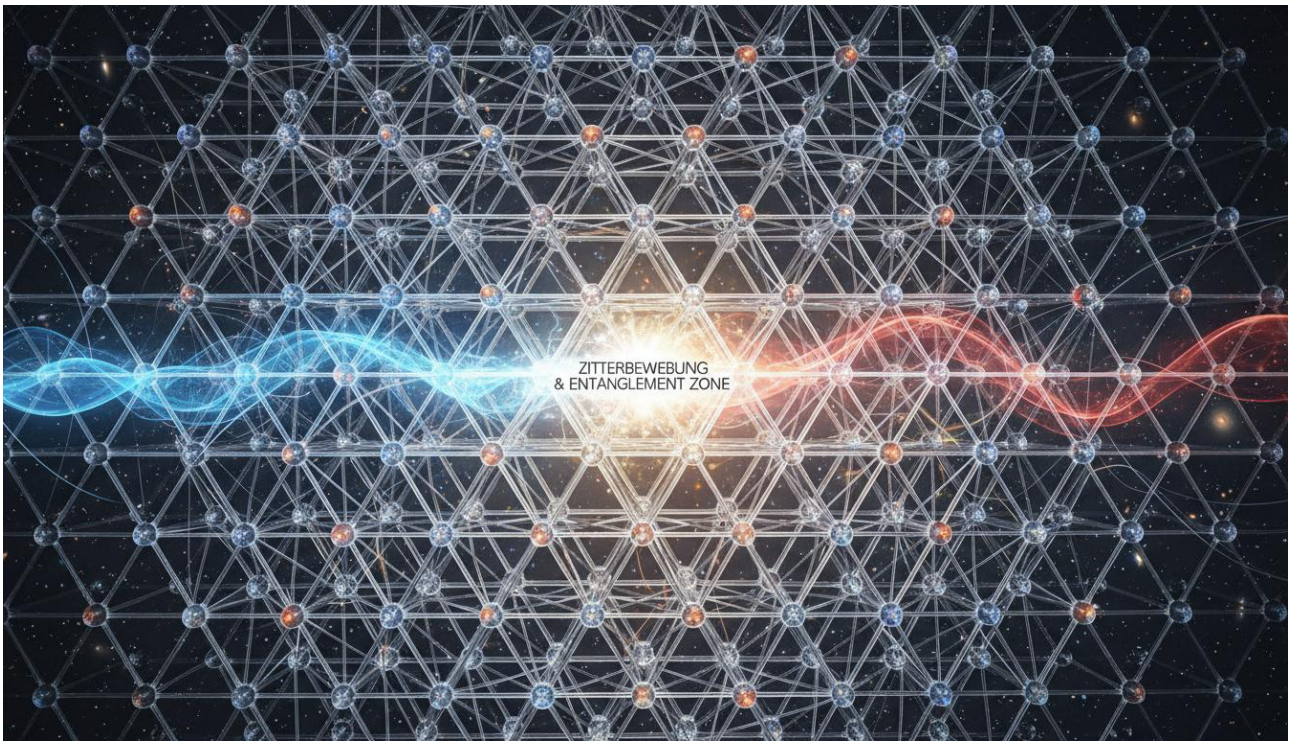

Figure 1 — *Coherent interaction between gravitational (red) and electromagnetic (blue) wave modes within the neutrinic tetragonal spacetime lattice. The central region illustrates Zitterbewegung and the entanglement zone of the Unified Field.*

1. Underlying Structure: The Tetragonal Neutrinic Lattice

The three-dimensional grid filling the scene represents the fundamental structure of spacetime, composed of double neutrinic cells (the *"double-sphere cells"*).
Each node of the lattice is a quantized unit of energy, consisting of two opposing hemispheres oscillating in phase and counterphase.
This internal dynamic underlies the primary neutrinic vibration that generates both gravity and electromagnetism.

In the language of the theory:

- The **local curvature** of the lattice corresponds to the **gravitational component** of the Unified Field;
- The **dynamic and rotational tension** between cells (due to phase variation) gives rise to the **electromagnetic component**.

2. Red and Blue Waves: Components of the Unified Field

The two sinusoidal waves — red and blue — represent, respectively:

- The **gravitational wave (red)**, associated with variations in the density and curvature of the spacetime lattice;
- The **electromagnetic wave (blue)**, generated by phase oscillations between neutrinic cells.

Their interference produces a region of **energetic entanglement**, where the fundamental resonance between the two components of the Unified Field manifests.
At this point, the waves can no longer be distinguished as gravitational or electromagnetic: they form a **coherent superposition**.

3. Central Zone: "Zitterbewegung & Entanglement Zone"

The luminous region at the center represents the **dynamic core** of the theory, where the mutual transformation between curvature energy and phase oscillation takes place.
Zitterbewegung (the high-frequency fractal vibration) describes the internal motion of the neutrinic point — that is, the **quantum pulsation of spacetime itself**.

In this zone:

- **Mass** emerges as a stationary state of oscillating energy;
- **Entanglement** between waves of opposite polarity ensures long-range coherence of the field.

In other words, *Zitterbewegung* is the **quantum signature** of the Unified Field, and **entanglement** is its **universal communication network**.

4. Cosmological Meaning and Unification

At the cosmological scale, the lattice reveals that spacetime is not a static vacuum but a **living network of synchronized oscillations**.
The image illustrates that:

- Gravitational and electromagnetic waves are **not separate entities**, but **different vibrational modes of the same fundamental medium**;
- Their interaction does **not violate relativistic locality**, but **transcends it through a distributed entanglement geometry**.

The image illustrates a possible way to visualize how gravity and electromagnetism interact within the framework of the *Unified Field Theory (SFT)*. According to this model, spacetime is not a continuous and empty background but a *quantized structure*, a sort of geometric fabric made up of fundamental units — the *neutrinic cells*. Each of these cells is formed by the dynamic relationship between a neutrino and an antineutrino, whose configuration gives rise to the tetragonal geometry of the spacetime lattice.

In the image, the **red waves** represent the *gravitational component*, while the **blue waves** represent the *electromagnetic component*. These two wave modes are not separate forces, but two different expressions of the same physical reality — the oscillatory behavior of the spacetime lattice itself. When their oscillations become synchronized, the system reaches a state of **quantum coherence**, where energy and information flow in harmony through the structure of spacetime.

At the center of the diagram lies a particularly significant region: the **Zitterbewegung** zone — the "trembling motion" that describes the intrinsic vibration of elementary particles. Here, coherence and decoherence alternate in a continuous rhythm, generating the dynamic processes that underlie both *local* and *non-local* interactions. This alternation defines what we perceive as the propagation of energy, or the transmission of coherence, through the field.

Within this coherent zone, **entanglement** naturally emerges. It is the physical manifestation of phase correlation between adjacent neutrinic cells, allowing instantaneous communication between distant points of the lattice. In this sense, entanglement is not a mysterious quantum phenomenon, but a structural property of the unified spacetime lattice itself.

The constant c — the speed of light — acquires a new meaning in this model: it represents the *fixed rate at which coherence propagates* from one cell to another within the neutrinic lattice. Light, gravity, and matter are thus revealed as different modes of the same fundamental process: the propagation of coherence across the quantized fabric of spacetime.

In summary, the image captures the essence of the Single Field Theory: **gravity and electromagnetism are two complementary oscillations of the same coherent field, intertwined within the geometric network of the neutrinic lattice that constitutes the very structure of spacetime.**
