Quantum Entanglement from Triplet Orbital Coherence in the Holosphere Lattice

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May 2025

Abstract

We present a physical model for quantum entanglement based on triplet orbital coherence within a discrete, cuboctahedral lattice of spinning spheres known as Holospheres. In this framework, the electron is modeled as a bound state of three dark bosons—rotational excitations formed around vacancy defects in the Holosphere lattice. One of these bosons acts as a coherence carrier, maintaining phase alignment across distant regions of the lattice and enabling nonlocal correlations.

This mechanism explains entanglement as an emergent property of phase-coherent angular momentum pathways rather than as a probabilistic wavefunction collapse. We extend the model to photons, proposing that light is composed of delocalized triplet modes of coherent rotational excitations, capable of sustaining entanglement through the lattice geometry.

We derive several testable equations describing phase coherence, decoherence thresholds, and spin coupling within this structure, and show how this model accounts for Bell violations, delayed-choice experiments, and quantum measurement outcomes without invoking superdeterminism or many-worlds branching. The Holosphere lattice offers a falsifiable, realist, and local explanation of quantum entanglement grounded in discrete geometry and rotational symmetry.

1 Introduction

Quantum entanglement remains one of the most profound and enigmatic features of quantum theory. Quantum entanglement remains one of the most profound and enigmatic features of quantum theory [1]. When two particles are entangled, measurements on one instantaneously influence the state of the other, regardless of the distance separating them. While entanglement is an experimentally confirmed phenomenon, its underlying mechanism remains theoretically opaque within standard interpretations.

The Copenhagen interpretation relies on probabilistic wavefunction collapse, while the Many-Worlds Interpretation posits a branching multiverse with decoherent branches to account for apparent measurement outcomes. Bohmian mechanics, or pilot-wave theory, introduces hidden variables guided by a deterministic quantum potential. While it retains realism and determinism, it requires explicit nonlocality in its equations and does not offer a physical explanation for the coherence carrier mechanism. Bohmian mechanics, while deterministic, requires a nonlocal pilot wave [4].

More recently, superdeterminism has been proposed as a resolution to the apparent nonlocality observed in Bell-type experiments. It posits that the settings of the measurement apparatus and the states of the particles are correlated due to a shared past, undermining the independence assumption in Bell's theorem. While logically self-consistent, superdeterminism is widely criticized for invoking a form of pre-established harmony that resists empirical disproof and undermines the notion of free experimental choice.

This paper offers a physically grounded alternative based on the Holosphere lattice framework. In this model, all of space is composed of a discrete lattice of spinning Holospheres—spherical units roughly at the scale of the neutron Compton wavelength. Electrons are described as composed of three dark bosons, each of which arises from an orbital excitation of a vacancy defect surrounded by six Holospheres in a cuboctahedral arrangement.

The key insight of this work is that one of these three bosons maintains long-range phase coherence across the lattice, allowing information to be preserved nonlocally between entangled particles. The remaining two bosons locally interact with the surrounding lattice, enabling observable correlations that manifest in measurement. We argue that this triplet orbital coherence mechanism can reproduce the predictions of standard quantum mechanics, including Bell inequality violations, without invoking superluminal signaling, wavefunction collapse, or the causal constraints of superdeterminism.

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We further propose that photons themselves can be understood as delocalized triplet excitations of the lattice—coherent phase waves composed of three interlinked oscillatory modes rather than localized orbitals. Entangled photons, then, retain their nonlocal coherence through symmetry-preserving lattice pathways rather than abstract wavefunction entanglement. This unified triplet-based framework offers a new interpretation of quantum entanglement that applies to both fermionic and bosonic systems.

The Holosphere lattice provides a discrete, Lorentz-compatible substrate through which coherence is physically maintained, offering a new interpretation of quantum entanglement as an emergent property of nested rotational phase structures. This approach bridges quantum theory and spacetime structure, with testable predictions distinct from other interpretations.

2 Structure of the Electron in the Holosphere Model

In the Holosphere lattice framework, all fundamental particles are modeled as excitations or defect structures within a discrete, recursively packed system of spinning spheres. At the neutron Compton wavelength scale, Holospheres form a tightly packed cuboctahedral lattice, each with rotational degrees of freedom and embedded defect sites. Within this structured medium, electrons are not point particles but composite excitations defined by localized, coherent arrangements of orbital dynamics.

Specifically, the electron is modeled as a triplet structure consisting of three dark bosons. Each dark boson arises from an orbital excitation of a vacancy defect surrounded by six Holospheres arranged in a cuboctahedral shell. These six Holospheres form a phase-locked orbital ring around the defect site, giving rise to a stable bosonic excitation characterized by rotational coherence, angular momentum, and directional phase alignment.

The three bosons that compose the electron are spatially adjacent but not overlapping, forming a stable triplet configuration through a combination of spin-coupling tension and lattice symmetry. Two of the bosons primarily interact locally with the lattice, enabling charge, spin, and mass properties to emerge. The third boson functions as a coherence carrier—it remains phase-aligned with distant regions of the lattice and is responsible for the long-range correlations observed in quantum entanglement.

This triplet model naturally explains several quantum phenomena:

- **Charge Quantization:** The rotational direction and handedness of the orbital shells around each defect determine the electron's negative charge. The same structure, when reversed in handedness, yields the positron.

- **Spin-$\frac{1}{2}$ Behavior:** The electron's net spin emerges from the combined angular momentum contributions of the three bosonic components, whose individual spin-like states are constrained by lattice symmetry.

- **Mass and Localization:** The stability and localization of the triplet depend on tension gradients and phase stiffness within the Holosphere lattice, defining the inertial mass of the electron.

$$\vec{S} = \vec{s}_1 + \vec{s}_2 + \vec{s}_3 \quad \text{with} \quad |\vec{S}| = \frac{\hbar}{2}$$

The total spin vector $\vec{S}$ of the electron arises from the coherent coupling of the angular momenta of the three dark bosons. Lattice symmetry constraints enforce that the resulting vector has a quantized magnitude of $\frac{\hbar}{2}$, consistent with observed fermionic spin.

This internal structure is critical to understanding how entanglement arises. The third boson's capacity to maintain coherence across the lattice underpins the nonlocal behavior of entangled electron pairs. When a measurement is performed on one member of the pair, it disrupts or collapses the coherence of the third boson, thereby terminating the entangled state. This mechanism provides a physically realistic and testable alternative to abstract wavefunction collapse.

3 Mechanism of Entanglement

In the Holosphere lattice model, quantum entanglement arises not from abstract wavefunction superposition but from the physical coherence of triplet structures distributed across discrete, phase-locked regions of the lattice. The coherence-carrying boson within the electron triplet serves as the link between entangled particles, maintaining a shared phase alignment through a structured medium of rotating Holospheres.

3.1 Coherence Maintenance via Triplet Orbitals

When two electrons are entangled, their third bosons—the coherence carriers—become phase-locked across a large-scale region of the lattice. This phase alignment ensures that measurements performed on one of the entangled particles will instantaneously determine the phase state of its partner, despite spatial separation. However, no superluminal information transfer is required: the coherence is preserved by the underlying symmetry and structure of the Holosphere lattice itself.

$$\Delta\phi = \phi_A - \phi_B \approx 0 \pmod{2\pi}$$

$$|\Delta\phi| < \epsilon_{\text{coh}}$$

Here, ϕ_A and ϕ_B are the angular phases of the coherence-carrying bosons in each electron. Entanglement persists as long as the phase difference remains below a critical misalignment threshold ϵ_{coh} set by the rotational tolerance of the Holosphere lattice.

This model provides a physically intuitive explanation for nonlocality. The third boson is not bound by classical locality because its phase coherence is defined relative to the entire lattice, not to any single position. As long as the lattice supports coherent propagation across the entangled region, the correlation remains intact.

3.2 Phase Locking Across Lattice Domains

The Holosphere lattice allows angular momentum and phase information to be transmitted across vast distances with minimal degradation due to its nested, tension-balanced structure. Each layer of the lattice recursively encodes angular phase relationships, permitting synchronized triplet dynamics to span macroscopic scales.

This phase locking occurs through tension gradients in the lattice that align angular momentum vectors between Holosphere shells. When two regions become entangled, the coherence bosons of each electron couple into the same rotational channel—a shared phase domain—enabling stable, bidirectional correlations. These rotational channels act as high-fidelity conduits for phase propagation, akin to fiber-optic coherence preservation in classical systems.

3.3 Triplet Interpretation of the Photon in the Holosphere Lattice

While the electron in the Holosphere lattice is modeled as a bound state of three dark bosons orbiting a central vacancy defect, the photon represents a distinct class of excitation. It is not localized around a defect but rather propagates as a delocalized, coherent triplet phase mode within the lattice.

We propose that photons emerge from synchronized oscillations of three interrelated vacancy configurations or phase-aligned spin distortions distributed across adjacent Holospheres. These transient triplet modes are not spatially bound but propagate as coherent transverse excitations, carrying both momentum and polarization information.

In this framework, the triplet structure of the photon is not a stable orbital like that of the electron, but a rotating coherence pattern—a wave packet composed of three interlinked phase components. This structure naturally supports the photon's spin-1 vector properties, with its polarization emerging from the relative phase orientations between the three rotating subcomponents.

Entangled photons, then, are described not as individual particles linked by abstract nonlocal wavefunctions, but as regions of the lattice in which threefold coherence patterns are phase-locked across macroscopic distances. The long-range entanglement observed in experiments is maintained by the underlying lattice structure, which permits coherent defect propagation at the speed of light along symmetry-preserving channels.

This interpretation accounts for polarization correlations and quantum interference in entangled photon pairs while avoiding the need for superluminal signaling or wavefunction collapse. It also suggests that decoherence in one photon corresponds to the disruption of its triplet phase alignment, which instantly terminates the shared coherence with its entangled partner.

3.4 Spin Correlations and Angular Phase Alignment

Spin in the Holosphere model is not an intrinsic point-like quantity, but a consequence of angular phase alignment within rotating Holosphere shells. Each of the three dark bosons that compose the electron contributes a directional phase component, and the total spin of the electron emerges from their collective alignment relative to the lattice.

When two electrons are entangled, the angular phases of their coherence bosons become correlated through lattice phase locking. The Holosphere lattice supports this coupling via angular strain channels—pathways along which rotational phase information can propagate without dissipation. As a result, the spin states of the two electrons remain correlated, not through instantaneously exchanged information, but through the preserved phase relationship between their coherence bosons embedded in a shared angular geometry.

Here, ϕ_A and ϕ_B are the angular phases of the coherence-carrying bosons in each electron. Entanglement persists as long as the phase difference remains below a critical misalignment threshold ϵ_{coh} set by the rotational tolerance of the Holosphere lattice.

This mechanism allows for the observed violations of Bell inequalities: measurements on one particle reveal outcomes consistent with the angular phase state of the other, even though no causal signal has passed between them. The rotational orientation of one coherence boson constrains the possible phase alignments of its entangled partner, ensuring outcome correlations consistent with quantum predictions.

3.5 Implications for Bell Tests and Quantum Nonlocality

Bell-type experiments test whether local hidden variable models can reproduce the statistical correlations predicted by quantum mechanics. Numerous experiments have shown that these correlations violate Bell inequalities, implying that either locality or realism (or both) must be abandoned under conventional assumptions.

In the Holosphere framework, Bell inequality violations are not due to nonlocal signaling, but to long-range coherence preserved through the structured lattice medium. The shared coherence domain between entangled particles enforces correlated outcomes without violating relativistic causality. The coherence boson maintains phase continuity across space, while local measurement interactions act to project the phase into a definite state.

This perspective allows us to retain realism—the coherence boson has a physical phase prior to measurement—without requiring instantaneous collapse or abandoning locality. The lattice structure distributes the entangled system's phase information across space in a way that mimics nonlocality, but is in fact mediated by coherent propagation within a relativistically invariant substrate.

This interpretation also sidesteps the assumptions rejected by superdeterminism. Rather than asserting pre-determined detector settings or conspiratorial correlations, the Holosphere model offers a concrete physical mechanism that explains the same outcomes using coherent lattice dynamics and internal angular tension rather than hidden variables or pre-established harmony.

4 Entanglement Dynamics

Beyond static correlations, quantum mechanics predicts and confirms dynamic entanglement behaviors—such as delayed-choice experiments and entanglement swapping—that challenge classical intuitions about causality and temporality. In the Holosphere model, these effects are naturally explained through the behavior of the coherence-carrying boson within the triplet structure and the capacity of the lattice to support distributed phase information.

4.1 Entanglement Swapping and Coherence Transfer

In entanglement swapping, two particles that have never interacted can become entangled via intermediate measurements on their respective partners. Within the Holosphere framework, this process is mediated by the reconfiguration of phase-coherent lattice channels connecting the coherence bosons of each triplet system.

When two triplet systems are locally measured in a correlated basis, their lattice coherence domains partially merge, allowing the phase-aligned bosons of previously uncorrelated particles to enter a shared rotational coherence region. This effectively "rewires" the lattice pathways, producing a new triplet-phase configuration that reflects the newly established entanglement.

The mechanism resembles wave interference and phase locking in classical systems, where coherent oscillators can entrain and synchronize through a common medium. The Holosphere lattice enables such reconfiguration without violating locality, as all coherence transfers occur via physical phase propagation through adjacent lattice nodes.

4.2 Delayed-Choice Entanglement and Retrocausal Appearances

Delayed-choice entanglement experiments appear to allow future measurement settings to influence past events. In conventional interpretations, this raises questions about retrocausality or temporal nonlocality. This apparent retrocausality has been explored in Wheeler's delayed-choice experiments [3].

In the Holosphere model, no backward-in-time influence is necessary. The coherence boson retains its phase alignment throughout the entangled system until decoherence is enforced by a measurement event. The outcomes remain indeterminate—but physically real—as long as the phase channel is intact. When the final measurement is made, it simply terminates the coherence by collapsing the lattice phase pathway, thereby finalizing the observable state in both regions.

The appearance of retrocausality is a result of projecting phase states backward in time using continuous models. In a discrete lattice, however, the entangled system is held in a metastable coherent configuration, and the timing of measurement merely defines the endpoint of that configuration. The system evolves deterministically along phase-coherent lines, with the measurement providing a final boundary condition—not a causal influence on the past.

4.3 Stability and Duration of Entanglement

The duration of entanglement in the Holosphere model is limited by lattice coherence times and tension gradients. As the coherence bosons remain phase-locked, any perturbation—such as thermal noise, defect interference, or symmetry-breaking strain—can disrupt the alignment and terminate the entanglement.

This provides a natural explanation for the loss of entanglement in noisy environments and accounts for why macroscopic systems do not exhibit persistent entanglement: the lattice strain gradients necessary to maintain coherence decay rapidly at larger scales. Only in carefully controlled environments with minimal decoherence sources can long-duration entanglement be sustained.

$$\tau_{\text{coh}} \approx \frac{\hbar}{\Gamma_{\text{strain}}}$$

Here, τ_{coh} is the coherence lifetime and Γ_{strain} is an effective dissipation rate for rotational phase strain in the Holosphere lattice. This expression estimates how long an entangled state can be maintained under ideal versus perturbed conditions.

This makes the Holosphere model consistent with observed quantum decoherence phenomena and provides a concrete substrate-level explanation for the quantum-to-classical transition without invoking observer-centric collapse.

5 Decoherence and Measurement

In conventional quantum mechanics, measurement is often associated with the abrupt and unexplained collapse of the wavefunction. In the Holosphere lattice model, measurement corresponds to a physically grounded process: the disruption of phase coherence within a triplet system—specifically the loss of alignment of the coherence-carrying boson with the surrounding lattice. Decoherence as a symmetry-breaking process has also been explored in open quantum systems [8].

5.1 Collapse as Phase Misalignment

The coherence boson within the triplet structure remains phase-locked with distant lattice regions until it encounters a disturbance or interaction that misaligns its rotational phase. This can occur due to measurement apparatus interactions, energetic perturbations, or local strain exceeding the coherence threshold.

Once misalignment occurs, the coherence channel through the lattice is broken, and the previously shared phase information is no longer preserved. This corresponds to the observed "collapse" of the quantum state, but unlike in standard quantum mechanics, it is not instantaneous or acausal—it results from a real, physical disconnection within the structured lattice.

5.2 Thresholds for Decoherence

The Holosphere lattice imposes limits on the stability of phase coherence. Each triplet configuration is stabilized by angular momentum conservation and tension equilibrium within its local lattice domain. However, this balance is sensitive to:

- **Thermal Fluctuations:** Random rotational noise can perturb coherence boson alignment.
- **Electromagnetic Interactions:** External fields may induce torque or polarization shifts, breaking phase-lock.
- **Measurement Interfaces:** The interaction with a macroscopic detector typically creates enough strain to force decoherence.

$$\frac{d\sigma}{dx} > \sigma_{\text{crit}}$$

Decoherence occurs when the spatial gradient of lattice strain $\sigma(x)$ exceeds the critical threshold σ_{crit}. This gradient disrupts the alignment of the coherence boson, leading to the collapse of the entangled state.

These factors set practical thresholds for when a triplet state becomes classical, offering a tangible mechanism for the quantum-to-classical transition without relying on observer-induced collapse or consciousness-based interpretations.

5.3 Measurement as Lattice Symmetry Dissociation

Measurement in this model is not the acquisition of knowledge, but a physical symmetry-breaking event. The coherence boson, when aligned with a detector's lattice region, must integrate into a new local angular momentum configuration. If the detector's lattice state is incompatible with the boson's phase, the original triplet structure dissolves, and the resulting state aligns with the detector's eigenbasis.

This process explains why measurements always yield discrete outcomes: the Holosphere lattice supports only a limited number of stable angular configurations, corresponding to the quantized eigenstates observed in experiments. Decoherence, then, is the resolution of lattice tension into one of these allowable configurations, producing a definite result consistent with quantum statistics.

6 Comparison with Standard Interpretations

The Holosphere lattice model provides a physically grounded alternative to standard quantum interpretations by attributing quantum behavior to the dynamics of discrete, phase-coherent structures in a rotationally symmetric spacetime lattice. This section compares the implications of the model with key interpretations of quantum mechanics, highlighting its strengths in realism, locality, and explanatory power.

6.1 Copenhagen Interpretation

The Copenhagen interpretation views the wavefunction as a probabilistic tool, with measurement causing instantaneous and irreversible collapse into one of several possible eigenstates. It treats quantum states as epistemic, denying the need for a physical mechanism underlying collapse.

In contrast, the Holosphere model provides a deterministic, physically realist account of measurement. Collapse corresponds to the loss of phase coherence in a structured medium, not an epistemic update. The outcomes of measurement arise from the dissociation of the triplet configuration through lattice tension gradients, eliminating the need for abstract observer-induced collapse.

6.2 Many-Worlds Interpretation

The Many-Worlds Interpretation posits that all possible measurement outcomes are realized in branching universes. The Many-Worlds Interpretation, proposed by Everett [5], eliminates collapse by positing universal branching. It avoids wavefunction collapse but introduces an infinite proliferation of unobservable branches.

The Holosphere model maintains a single physical universe with deterministic coherence dynamics. Instead of branching, it explains outcome selection via symmetry-breaking in a finite lattice with a constrained set of allowable phase alignments. It reproduces quantum probabilities through statistical distributions of lattice configurations, not ontological multiverses.

6.3 Bohmian Mechanics (Pilot-Wave Theory)

Pilot-wave theory introduces hidden variables and a guiding wave to account for particle behavior, preserving determinism but at the cost of explicit nonlocality. It provides no physical explanation for the nature or origin of the pilot wave or why entanglement correlations emerge without signaling.

The Holosphere model shares Bohmian mechanics' commitment to realism and determinism but replaces the abstract pilot wave with concrete rotational coherence in a structured lattice. It avoids superluminal influence by embedding phase correlations within the lattice itself, allowing local propagation to account for nonlocal correlations.

6.4 Superdeterminism

Superdeterminism claims that apparent randomness in quantum experiments is illusory and that all outcomes—including detector settings—are pre-determined due to deep correlations established at the origin of the universe. While logically consistent, it is often criticized as unfalsifiable and incompatible with the notion of experimental freedom. Superdeterminism has been recently revisited as a way to challenge the independence assumption in Bell's theorem [7].

The Holosphere model does not require pre-established correlations. Instead, it explains entanglement through dynamically sustained phase coherence in the lattice. The apparent violation of Bell inequalities is not due to hidden causal constraints, but due to real-time coherence preservation that emerges from the structure of the lattice and the dynamics of the triplet system.

6.5 Summary Comparison

Interpretation	**Realism**	**Locality**	**Collapse**	**Mechanism**
Copenhagen	No	Yes	Yes	Epistemic
Many-Worlds	Yes	Yes	No	Branching
Bohmian	Yes	No	No	Pilot Wave
Superdeterminism	Yes	Yes	No	Initial Conditions
Holosphere Model	Yes	Yes	Yes	Coherence Misalignment

The Holosphere model preserves locality and realism without requiring abstract mathematical postulates, multiverse branching, or conspiratorial determinism. It introduces a testable, physically explicit substrate for quantum coherence and its breakdown under measurement.

7 Predictions and Experimental Tests

A core strength of the Holosphere lattice model is its capacity to generate specific, falsifiable predictions that distinguish it from both standard quantum mechanics and other interpretations. These predictions arise from the physical behavior of coherence-carrying bosons in the structured spacetime lattice and the conditions required to maintain or disrupt phase alignment.

7.1 Coherence Thresholds and Measurement Outcomes

The model predicts that decoherence should depend on the local strain, temperature, and angular tension within the lattice. Measurement outcomes should correlate with environmental conditions in ways that deviate subtly from standard probabilistic quantum models.

- **Prediction:** Varying lattice tension (e.g., through electromagnetic or gravitational stress) should affect entanglement stability and measurement collapse rates.
- **Test:** Apply external rotational or field-based strain to entangled systems and measure correlation degradation versus control samples.

7.2 Spatial Phase Retention in Delayed-Choice Setups

Since coherence is maintained as a physical phase alignment across the lattice, interference effects and outcome probabilities should be sensitive to the spatial arrangement and history of the lattice path, not just the instantaneous detector settings.

- **Prediction:** Delayed-choice entanglement outcomes should shift when lattice strain gradients are introduced between the emission and detection event, even if standard theory predicts invariance.
- **Test:** Introduce angular strain or polarization-modifying fields mid-path between entangled particle pairs and measure if outcome correlations shift.

7.3 Decoherence Dynamics in Macroscopic Superposition States

The Holosphere model asserts that the decay of superposition is governed by the coherence breakdown of lattice-encoded triplet states. The model predicts a minimum scale of decoherence related to the capacity of the lattice to maintain alignment across large regions.

- **Prediction:** There exists a measurable cutoff length or mass threshold above which entangled states cannot be sustained, independent of environmental noise.
- **Test:** Perform scaled-up superposition experiments (e.g., massive interferometers or opto-mechanical systems) to identify coherence limits not explained by decoherence models alone.

7.4 Polarization Entanglement Limits from Lattice Topology

If polarization arises from triplet phase orientation in the Holosphere lattice, certain topological constraints should limit allowable entangled polarization angles under high angular strain.

- **Prediction:** Polarization correlation strength will show quantized or stepped reductions under conditions of topological distortion in the lattice (e.g., under torsion or curvature).
- **Test:** Modify waveguide geometry or perform polarization entanglement experiments in gravitational gradient environments and detect angular deviation effects.

7.5 Implications for Quantum Communication and Computation

The model suggests that maintaining coherence is a function of structural alignment and tension uniformity across the lattice. This could lead to practical criteria for enhancing or stabilizing quantum communication channels.

- **Prediction:** Quantum key distribution protocols that track and compensate for lattice phase strain (e.g., via auxiliary calibration pulses) will show enhanced stability and fewer decoherence events.
- **Test:** Compare fidelity rates of QKD systems that incorporate rotational phase correction with those that do not.

8 Conclusion

In this paper, we have presented a discrete, physically grounded model of quantum entanglement based on triplet orbital coherence within the Holosphere lattice. In this framework, the electron is composed of three dark bosons—coherent orbital excitations around vacancy defects in a cuboctahedral lattice of rotating Holospheres. One of these bosons serves as a long-range coherence carrier, linking entangled particles through phase-locked rotational channels in the lattice.

This approach resolves the mysteries of quantum nonlocality and entanglement without invoking abstract wavefunction collapse, hidden variable conspiracies, or branching universes. Instead, it attributes entanglement to the persistence of rotational phase coherence across a discrete, Lorentz-compatible spacetime structure. Measurement and decoherence arise from physical misalignment and strain-induced disruption of this triplet configuration.

We extended the model to photons, proposing that light itself emerges as a delocalized triplet of coherent oscillations within the lattice—consistent with spin-1 behavior and polarization correlations observed in entangled photon experiments. Bell-type violations, delayed-choice phenomena, and entanglement swapping are all explained as manifestations of metastable coherence pathways maintained by the lattice's angular structure.

The Holosphere model restores realism and locality to quantum theory by embedding coherence in a tangible, testable substrate. It predicts measurable effects under conditions of lattice strain, phase distortion, and gravitational influence, offering falsifiable alternatives to conventional interpretations.

By unifying entanglement, measurement, and decoherence within a single, discrete geometric framework, the Holosphere lattice model opens new avenues for understanding quantum mechanics as an emergent feature of structured spacetime. Future work will explore its implications for quantum field theory, relativistic invariance, and the unification of forces via spin-tension networks.

Definitions and Variables

- ϕ_A, ϕ_B — Phase angles of the coherence-carrying bosons in two entangled particles.

- $\Delta\phi$ — Phase difference between coherence bosons: $\Delta\phi = \phi_A - \phi_B$.
- ϵ_{coh} — Critical phase deviation threshold for maintaining entanglement.
- $\vec{s}_i$ — Individual angular momentum vector of the ith dark boson in a triplet.
- $\vec{S}$ — Total spin vector of the electron triplet: $\vec{S} = \vec{s}_1 + \vec{s}_2 + \vec{s}_3$.
- $\sigma(x)$ — Local angular strain (rotational tension gradient) in the Holosphere lattice at position x.
- $\frac{d\sigma}{dx}$ — Spatial derivative of strain; decoherence occurs when this exceeds σ_{crit}.
- σ_{crit} — Critical angular strain gradient beyond which lattice coherence collapses.
- τ_{coh} — Maximum coherence lifetime of an entangled state.
- Γ_{strain} — Effective dissipation rate of lattice phase coherence due to strain or perturbation.
- $\hbar$ — Reduced Planck constant, $\hbar = \frac{h}{2\pi}$.

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