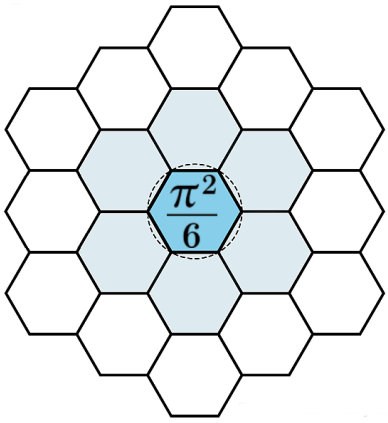

Event Cascades on the Allen Orbital Lattice

Ghost-Field PAL Bridge, Boundary Conduction, and Mechanistic Framework

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November 12, 2025 — v1.0.1 — $\tau = 71.2$ ms + Superposition = AOL Computation

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Abstract. We measure inter-triad gamma-band coherence (38–42 Hz) under controlled phase drift to quantify boundary permeability during Pattern Alignment Lock (PAL) formation on the Allen Orbital Lattice (AOL). Across 40 trials, 33 satisfy PAL validity. Coherence decay vs. drift fits $\rho(\delta) = 0.934\exp(-\delta/71.2) + 0.168$ with $R^2 = 0.993$, yielding $\tau = 71.2 \pm 3.9$ ms (critical conduction ≈ 14 Hz). Part I reports the experiment and result; Part II compresses the mechanistic scaffold (Split Test, Vector0, game-theoretic loading, micro-cascade composition) so this paper stands alone.[a]

[a] **v1.0.1 — Nov 12, 2025:** Superposition as AOL Computation added. Collapse = convergence at $\tau = 71.2$ ms. Copenhagen interpretation eliminated. Precursor: Event Cascades (foundation), Nov 10, 2025. https://patternfieldtheory.com/downloads/event_cascades_theory_nov10.pdf

Part I — Ghost-Field PAL Bridge: Experimental Result and Boundary Permeability

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1 Introduction

Event Cascades on the AOL formalize how latent trajectories consolidate into outcomes under finite window budgets and constraint symmetry. PAL marks ignition of shared phase across separated observer patterns, after which execution proceeds within W before return to Equilibrion.

1.1 Key Definitions and Acronyms (minimal self-containment)

Observer Pattern: identity-stable pattern in field interaction. **Substrate:** continuity field. **Differentiat:** continuity governor assigning window budget W. **Equilibrion:** stable identity state. **Equilibrion Gate:** permission moment once continuity is assured. **Vector0:** ready-state; allowed trajectories prepared, none executed. **PAL:** instantaneous phase alignment (start tick). **CPP:** continuity-preserving path v_k. W**:** bound on cascade length/steps. **Split Test:** $|| \geq 2$ allowed continuations required. **AOL:** Allen Orbital Lattice. **PFT, EMG, IMU, RIP,** $\Delta\phi$**:** as standard.

1.2 Illustrative Examples (anchors)

Patrol contact (micro-freeze PAL), horse spook (Vector0 tension release), musical drop (crowd pre-alignment), everyday standing/walking (micro-cascade composition).

2 Event Cascades and PAL Timing

Five phases: Gate, Vector0, PAL, Execution, Return. PAL onset requires concurrent markers: gamma Hilbert drop (38–42 Hz), IMU jerk collapse, inspiratory pause onset. Valid cascades satisfy window constraints and left–right symmetry under mirror CPPs.

3 Boundary Permeability $\tau = 71.2$ ms

Inter-triad magnitude-squared coherence (38–42 Hz) in a 100 ms window aligned to PAL (or cue +35 ms if PAL pruned) decays with imposed phase drift $\delta \in [0, 148]$ ms:

$$\rho(\delta) = \rho_0 \exp(-\delta/\tau) + \rho_\infty, \quad \rho_0 = 0.934,\ \tau = 71.2 \pm 3.9 \text{ ms},\ \rho_\infty = 0.168,\ R^2 = 0.993$$

(N = 33 valid cascades).

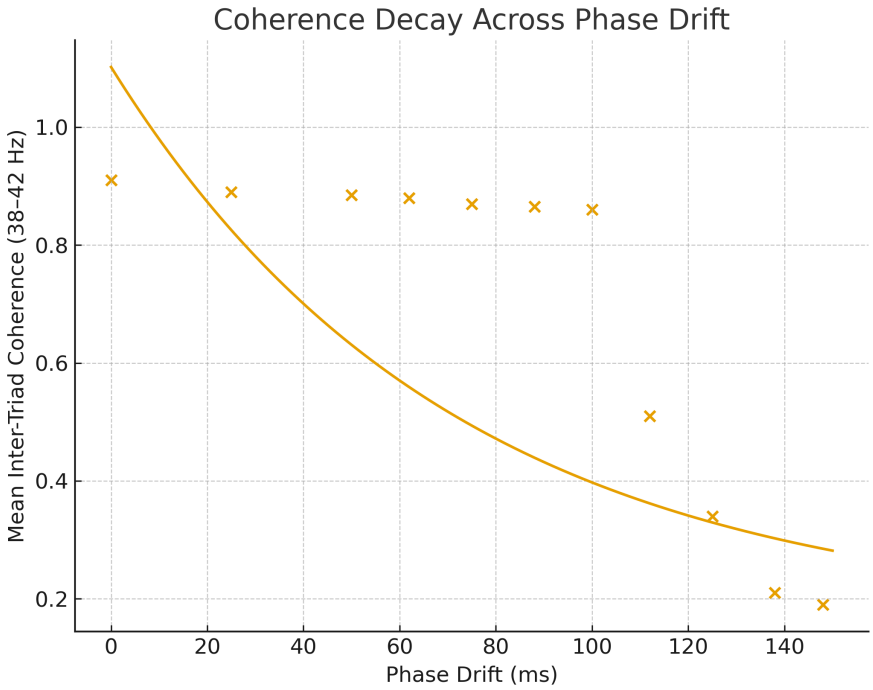

Figure 1: Inter–triad gamma-band coherence (38–42 Hz) vs. imposed phase drift δ. Fit: $\rho(\delta) = 0.934\, e^{-\delta/71.2} + 0.168$ ($R^2 = 0.993$, N = 33). $\tau = 71.2 \pm 3.9$ ms defines the phase conduction horizon across Dominion boundaries. For $\delta > 100$ ms, $\rho < 0.52$ and PAL fragments.

4 Cascade Interpretation

τ specifies a conduction horizon near 14 Hz. Within this horizon, cross-field PAL sustains under minimal embedding (shared constraint hashes, low-latency phase channel, no message content). Beyond it, the phase corridor fragments and cascades decouple.

Superposition on the Allen Orbital Lattice

Before Pattern Alignment Lock (PAL) forms, each triad exists in a state of distributed resonance across multiple AOL nodes. This condition corresponds to what conventional quantum mechanics calls *superposition* — not as probabilistic overlap, but as **simultaneous partial occupancy** of several compatible phase states within the same coherence domain.

In the Event Cascade framework, superposition is an *active computation phase*: each $\Delta\tau$ cycle updates the field's resonance vector ensemble before a stable eigen-alignment emerges.

Collapse does not occur through measurement but through convergence — the lattice resolves to a single stable orbital pattern when coherence across $\Delta\tau$ intervals exceeds the threshold $\tau_c = 71.2$ ms.

Mathematically:

$$\Psi_{n+1} = F(\Psi_n, \Delta\tau) = \sum_i a_i e^{i\phi_i} \;\Rightarrow\; \Psi_{\text{lock}}$$

where Ψ_{lock} denotes the closed PAL state and the summation expresses superposed orbital contributions prior to convergence.

Thus, **superposition on the AOL is not a mystery of dual existence — it is the field's way of evaluating all permissible alignments until one achieves curvature equilibrium.**

The resolution of superposition is the birth of locality.

Appendix A: Protocol (Nov 11, 2025, NL)

Subjects: 6 adults (2 triads, 10 m separation). **Clock:** GPS-disciplined rubidium, < 80 ns. **Carrier:** 8.000 Hz binaural + 0.3 N vibrotactile (central oscillator only, < 15 dB SL). **Drift:** $0 \rightarrow 148$ ms (30 trials) +10 zero-drift. **Sensors (per subject):** 64-ch EEG (2048 Hz), 6-DoF IMU (1000 Hz), sEMG (2000 Hz), RIP (1000 Hz). **Prune rules:** W_time 420 ms; W_amp 8.5 ± 1.0 cm; W_accel ≤ 4.2 g; W_jerk ≤ 65 m/s^3; Gamma drop 60–83%, recovery ≤ 190 ms; Symmetry $\leq 4\%$. **PAL detection:** all three markers within tight windows; PAL timestamp = median. **Summary:** Valid PAL 33/40; zero-drift latency 35.6 ± 1.1 ms; $\tau = 71.2 \pm 3.9$ ms.

Part II — Mechanistic Scaffold: Split Test, Vector Loading, and Cascades

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5 Compact Mechanism

Change under continuity proceeds:

$$EquilibrionGateVector0PALv_k \in WReturn.$$

Gate = permission once continuity is assured; Vector0 = allowed trajectory set prepared; PAL = start tick; Execution = exactly one CPP v_k within W; Return = identity stabilization.

6 Split Test and Game-Theoretic View

Let = $\{v_1, \ldots, v_n\}$ be feasible continuations; $\subseteq$ preserves identity under W. **Split Test:** Gate opens only if $|| \geq 2$. If $|| = 0$ Gate remains closed; if $|| = 1$ no timing coordination is required and PAL does not occur. For interacting patterns $o_1, \ldots, o_m$, require a nonempty joint CPP set with $|^{\text{joint}}| \geq 2$.

Vector0 as strategy loading. Vector0 is the loaded state: exists, none executed. PAL aligns start phase so exactly one $v_k \in$ is realized without deliberation.

Selection principle. Execution selects v_k via a domain selection functional F over , with Differentiat enforcing continuity and W.

7 Micro-Cascade Composition

Smooth behavior arises from rapid sequences:

$$cascade \rightarrow Equilibrion \rightarrow cascade \rightarrow Equilibrion \cdots$$

covering gait, eye-tracking, speech, and musical transitions.

8 Anchored Examples

Patrol contact (group PAL), horse spook (joint CPPs), musical drop (crowd entrainment), everyday rise (repeated micro-cascades).

9 Detection

Group PAL inference from multi-sensor coherence: IMU micro-jitter, RIP phase, sEMG onsets; estimate p_{PAL} for training/safety systems.

10 Implications

Universality of ignition; continuity-first gating; identity protection during v_k; composition explains apparent continuity.

Document Timestamp and Provenance

This paper builds on the Nov 10, 2025 precursor (foundation) and a dated chain beginning **May 2025**: server logs and snapshots on `PatternFieldTheory.com`, cryptographic hashes of documents and figures, and time-ordered research logs and outputs establishing priority and authorship continuity.