Excitation, Apparent Propagation, and Measurement Coupling

Expanded Depth Series: Paper 6

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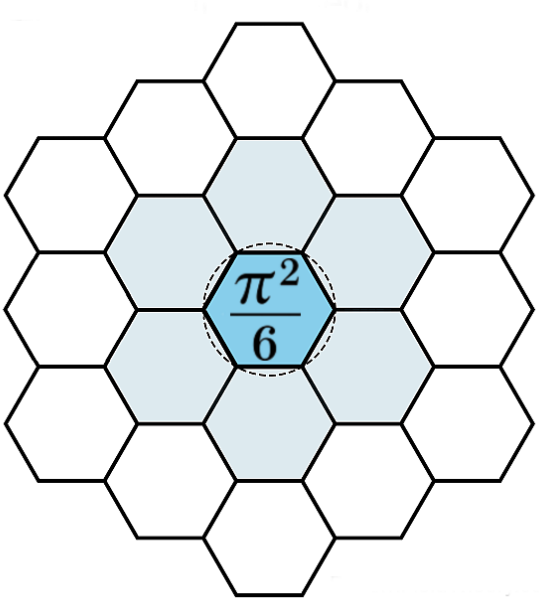

Abstract

This paper introduces excitation and apparent propagation within Pattern Field Theory without invoking motion, trajectories, or signal transmission. Excitation is defined as a structural deviation from equilibrium coherence under fixed lattice constraints. Apparent propagation arises from sequential reconfiguration of coherence support across the Allen Orbital Lattice.

Measurement is treated as a coupling event between coherent structure and external constraint systems, not as a collapse or observer-dependent process. This framework reproduces observed propagation, interference, and localization phenomena while preserving the non-particle ontology established in earlier papers.

1 Orientation and Dependency

This paper depends explicitly on the structures fixed in Papers 1 through 4 of the Expanded Depth Series.

Paper 3 established coherons as stable duplex curvature identities governed by Phase Alignment Lock. Paper 4 showed how coheron interaction, basin capacity, and structural periodicity arise without particles or forces.

The present paper addresses phenomena traditionally described as motion, propagation, and measurement. No new ontological primitives are introduced. In particular, there are no propagating entities, no exchange carriers, and no observer-induced dynamics.

The goal is to explain how change, influence, and observation arise from reconfiguration of coherence under fixed structural constraints.

2 Excitation as Structural Deviation

Excitation in Pattern Field Theory is not the addition of energy to a particle or the promotion of a state along a trajectory.

Definition 1 (Excitation)**.** *Excitation is a structural deviation from a locally stable coheron configuration that preserves identity while altering constraint satisfaction margins.*

An excited coheron remains phase-aligned but operates closer to the boundary of PAL neutrality. Constraint loops remain closed, yet reduced tolerance to phase drift makes the configuration more sensitive to environmental coupling.

Excitation therefore represents stored structural tension, not motion. It is a static displacement within the space of admissible configurations, not a temporal process.

3 Locality and Constraint Reconfiguration

Although coherons do not move, excitation can appear to travel.

This apparent propagation arises when excitation induces successive reconfiguration of coherence support across adjacent lattice regions. As one region stabilizes, another destabilizes, producing a sequence of constraint adjustments that mimic motion.

Definition 2 (Apparent Propagation)**.** *Apparent propagation is the ordered redistribution of excitation through sequential constraint reconfiguration on the Allen Orbital Lattice.*

No entity traverses space. Instead, the locus of excitation shifts as local PAL conditions are satisfied in one region and violated in another. Propagation speed reflects lattice recurrence structure and coherence reconfiguration rates, not signal velocity.

This mechanism replaces trajectory-based propagation with structural continuity.

4 Sequential Reconfiguration and Apparent Trajectories

Classical descriptions of motion rely on trajectories traced by entities through space. In Pattern Field Theory, no such entities exist.

What appears as a trajectory is instead a record of sequential coherence reconfiguration across the Allen Orbital Lattice.

Definition 3 (Apparent Trajectory)**.** *An apparent trajectory is the ordered sequence of lattice regions in which Phase Alignment Lock transitions from marginally satisfied to fully satisfied under excitation redistribution.*

Each step in this sequence corresponds to a local stabilization event. The previous region relaxes toward equilibrium while the adjacent region absorbs structural tension. The resulting pattern mimics continuous motion without requiring displacement.

This process is inherently discrete. Continuity emerges only at scales where individual reconfiguration steps cannot be resolved.

Proposition 1. *All apparent trajectories in Pattern Field Theory are projections of discrete constraint reconfiguration sequences.*

This replaces kinematics with structural bookkeeping.

5 Measurement as Constraint Coupling

Measurement is not a special intervention that collapses a state. It is a physical coupling between a coheron configuration and an external constraint system.

Definition 4 (Measurement Coupling)**.** *Measurement coupling is the imposition of additional structural constraints on a coheron configuration by an interacting macroscopic system.*

Measurement devices are themselves coherence-supporting structures. When coupled to a coheron, they restrict the set of admissible PAL-compatible configurations. The coheron must reconfigure to satisfy the combined constraint set or lose stability.

Observed outcomes correspond to the subset of configurations that remain stable under coupling. No collapse occurs. Incompatible configurations are simply not supported.

This explains measurement outcomes without observer dependence, wavefunction collapse, or probabilistic axioms.

6 Localization, Interference, and Observed Phenomena

Phenomena such as localization and interference arise naturally from constraint geometry and basin structure.

Localization occurs when measurement coupling restricts coherence support to a minimal lattice region. Interference arises when multiple coherence paths compete for PAL satisfaction under shared constraints.

Lemma 1. *Interference patterns correspond to regions of alternating PAL compatibility and incompatibility under constraint superposition.*

What appears as wave-like behavior is the spatial imprint of constraint competition. What appears as particle-like behavior is the enforced localization of coherence under measurement coupling.

Both descriptions emerge from the same underlying mechanism.

7 Summary of Structural Results

This paper has established the following results:

- Excitation is a structural deviation within PAL-stable coherence.
- Apparent propagation arises from sequential constraint reconfiguration.
- No entities move, and no trajectories exist fundamentally.
- Measurement is constraint coupling, not collapse.
- Localization and interference are structural outcomes of coupling.

These results complete the replacement of dynamical and probabilistic descriptions with structural coherence logic.

8 Closure

Excitation, propagation, and measurement in Pattern Field Theory require no particles, forces, or observers.

All observed phenomena arise from the interaction of coherent identity with finite structural constraints imposed by the Allen Orbital Lattice. Change is reconfiguration. Motion is sequence. Observation is coupling.

With this paper, the foundational account of dynamics and measurement is complete within Pattern Field Theory.

Document Timestamp and Provenance

This document is part of Pattern Field Theory (PFT) and the Allen Orbital Lattice (AOL). It defines excitation, apparent propagation, and measurement coupling used by subsequent papers in the series.