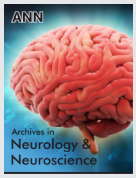

ISSN: 2641-1911

DOI: 10.33552/ANN.2026.18.000950

Archives in Neurology & Neuroscience

Iris Publishers

Review Article

A Quantum–Energetic Model of Memory: The Furrows Theory and the Imprint of Information in Granular Space–Time

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Received Date: August 06,2026

Published Date: August 12, 2026

Abstract

The persistence of memory remains one of the least understood phenomena in contemporary neuroscience. Current biochemical and synaptic models account for the transmission of information but fail to address its ontological substrate—the physical nature of remembrance itself. The Furrows Model proposes a novel framework in which memory is conceived as a quantum-energetic imprint within a granular space–time substrate. This imprint emerges from the interaction of photons, phonons, and other quasiparticles within the vibrational lattice of cellular structures. Such "furrows" constitute coherent energetic configurations capable of preserving information in non-local vibrational form and of being reactivated through resonance. By integrating quantum field theory, biophoton research, phononic dynamics, and epigenetic signaling, this theory outlines a transdisciplinary paradigm for understanding memory as organized energy, bridging physics, biology, and consciousness.

Keywords: Quantum memory; Biophotons; Phonons; Granular space–time; Neurophysics; Furrows model; Energetic information; Coherence

Introduction

Despite substantial advances in neuroscience, the ontological nature of memory remains one of the most enigmatic issues in contemporary science. Dominant biochemical and synaptic theories describe neuronal transmission and plasticity but do not explain how and where information is preserved once the sensory stimulus has ceased [1-5].

The Furrows Theory proposes a radical shift in perspective: memory is not a mere biochemical epiphenomenon but a persistent energetic structure inscribed within the granular topology of space–time. Each perceptual event—visual, auditory, tactile, or emotional—generates a quantized vibrational trace, a furrow, within the subcellular lattice. This imprint is not symbolic but physical: a coherent energetic configuration capable of being reactivated through resonance when new stimuli share the same frequency signature [5-10].

Theoretical Foundations

Granular Space–Time and the Geometry of Information

The model is based on the assumption that space–time is not continuous but composed of sub-Planckian discrete units susceptible to local deformation. Each energetic interaction—photonic, phononic, or bioelectromagnetic—can temporarily modify the geometry of these units, producing a micro-vibrational imprint: the furrow. This deformation constitutes the physical matrix of memory [10-15].

Conservation of Energy and Information Persistence

Since information represents an organized form of energy, it cannot vanish but only transform. The brain—and biological systems in general—can therefore be described as coherent

resonant fields, in which furrows act as "quantum memory wells," retaining their original vibrational coherence over time.

Biophotons and Phonons as Information Carriers

Several studies (Fritz-Albert Popp, Colli, van Wijk) have demonstrated that living systems emit coherent biophotons involved in intracellular information transmission. In parallel, phononic oscillations within microtubules and protein lattices (Hameroff, Penrose) suggest the presence of stable vibrational memories based on coherent quantum states. These photonic and phononic components therefore constitute the complementary foundations of the energetic architecture of memory.

Localization and Resonance Mechanisms

Each sensory stimulus is transduced into an electromagnetic vibrational pattern distributed across specific cortical areas (occipital for vision, temporal for audition, limbic for emotional processing). Once imprinted, these patterns are reactivated through resonance—not reconstructed—when new frequencies overlap with pre-existing ones. The memory thus re-emerges as a vibration retracing its original energetic path.

Core Hypotheses

- Memory is a coherent energetic phenomenon, not a cumulative biochemical process.
- Furrows are vibrational imprints in granular space–time, produced by the passage of photons, phonons, and other quasiparticles through cellular lattices.
- Each memory possesses a unique frequency signature, retrievable through resonance with internal or external stimuli.
- Information has a real physical localization, potentially measurable through biophotonic or vibrational emissions.
- Imagination and creativity arise from the combinatorial reactivation of multiple furrows, generating new energetic configurations and mental contents.

Discussion

Comparison with Classical Neuroscientific Models

Synaptic theories (Hebb, Kandel) explain neuronal plasticity but not long-term persistence of information. The Furrows Theory instead proposes a mechanism of quantum-level conservation, independent of synaptic connections, capable of explaining the survival of long-term memories even during periods of neuronal inactivity [15-20].

Epigenetic Memory and Cellular Resonance

Numerous studies have identified memory-like capabilities in non-neuronal cells. This "epigenetic memory"—based on vibrational and piezoelectric signals—may share the same principle as furrows: energetic imprints within subcellular lattices responsible for the intergenerational transmission of non-genetic information [20-25].

Interdisciplinary Implications

The model connects and integrates multiple research domains:

- Quantum physics: coherence, non-locality, granular space–time
- Neuroscience: neural correlates of resonance and memory reactivation
- Epigenetics: vibrational mechanisms of cellular memory
- Morphic fields (Sheldrake): non-local informational organization

The Furrows Theory thus offers a transdisciplinary synthesis that overcomes the mind–matter dualism and introduces a unified neurophysics of information.

Experimental Perspectives

- Cerebral biophotons: analysis of coherent photon emission during memory encoding and recall
- Phononic resonance: investigation of quantum vibrations in microtubules and neuronal proteins via high-resolution spectroscopy
- Quantum simulations: computational modeling of furrows within discrete energetic lattices to observe interference and coherence phenomena
- Non-local effects: examination of memory-related correlations between cells or individuals in coherent or entangled states [25-36]

Conclusions

The Furrows Theory proposes a unifying paradigm for understanding memory as a physical-energetic phenomenon inscribed within granular space–time. Integrating quantum physics, biophotonics, phononic dynamics, and epigenetics, it provides a theoretical framework capable of explaining the persistence, resonance, and regeneration of information within the mind and biological systems. In the absence of comparably comprehensive alternative models, this theory constitutes the most advanced current hypothesis for a neurophysics of information, capable of bridging science, consciousness, and the quantum field.

Acknowledgement

None.

Conflict of Interest

No Conflict of interest.

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