

Explaining Qualia and Quantum Wave Collapse with Tanmatron Field Theory: A Dual-Aspect Research Program Unifying Consciousness Science and Quantum Foundations

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Abstract

The subjective-objective divide remains a central bottleneck across contemporary physics, neurobiology, and consciousness research. Mainstream physicalism relies on a bottom-up reductionism that treats consciousness as an emergent epiphenomenon, while alternative dualisms frequently succumb to the combination problem. This paper introduces to Western science and philosophy Prabhat Ranjan Sarkar's fundamental concept of *tanmatra*, a Sanskrit word originally from ancient Samkhya philosophy. Sarkar's *tanmatra* is a sensory inference or generic essence associated with physical vibrations, such as redness associated with certain photon frequencies. Emitted from physical matter, *tanmatras* travel through sensory organs and nerves to produce subjective sensory qualia in minds, opening a new approach to consciousness research. To develop this concept mathematically for consciousness and quantum research, the paper then introduces Tanmatron Field Theory (TFT) as a proposed dual-aspect research program that extends standard Quantum Field Theory (QFT) by coupling physical fields to a five-dimensional Tanmatric State Vector $\Phi_{\text{Tanmatric}}$. Based on the consciousness cosmology of P. R. Sarkar (*Ananda Sutram*), TFT formalizes the Law of Attributional Capacity as a constant scalar invariant conservation law ($\sum I_n = C_{\text{Total}} = 100$). Using the observed invariant relationship between physical vibrational frequency and subjective quality, the principle of Physical Phase-Locking establishes how subjective qualities are deterministically bound to physical wave dynamics.

Rather than relying on probabilistic frameworks to identify tanmatric gateways from sensory nerves to the mind, TFT defines biological Appropriative Points (A-points) as deterministic spatial boundary conditions located at anatomical "geographical dead ends" in the primary sensory cortex (Layer IV of V1, Heschl's Gyrus). At these terminal coordinates, TFT proposes that the physical signal uncouples, and its quantitative energy is conserved within a total dual-aspect Lagrangian system as mental *tanmatras* project onto and vibrate the mental plate (*Citta*), observed by the *Aham* as qualitative experiences (qualia) and physical objects.

By replacing bottom-up fragmentation with a top-down field interaction hypothesis, this paper presents a unified tanmatra-based framework offering novel resolutions of thirteen foundational consciousness (1-13) enigmas and six quantum (14-19) enigmas: 1) Descartes' Mind-Body problem, 2) Chalmers' 'Hard Problem', 3) Locke's Inverted Spectrum, 4) Searle's Chinese Room, 5) Jackson's 'Mary's Room', 6) Nagel's Bat's Perception anomaly, 7) Direct vs. Indirect Realism, 8) the Binding Problem, 9) AI Consciousness, 10) Block's Absent Qualia Enigma, 11) the Evolutionary Enigma of consciousness, 12) Panpsychism's Combination Problem, 13) Non-Local Awareness during flatline events (NDEs/Anesthesia), 14) the Double-Slit Experiment, 15) the Copenhagen Measurement Problem, 16) the Schrödinger's Cat Enigma, 17) the Many-Worlds

Interpretation (MWI) exclusion, 18) the Einstein-Podolsky-Rosen (EPR) Paradox / Bell's Theorem, and 19) Misra and Sudarshan's Quantum Zeno Effect Paradox. We demonstrate that the six quantum resolutions form a complete foundational set that subsumes secondary quantum paradoxes such as Wigner's Friend and the Delayed-Choice Quantum Eraser.

Finally, we outline an empirical research program to search for A-points—utilizing volatile anesthetic interdiction at primary cortical gateways—and propose Eco-Phenomenological Virtual Reality (VR) applications to test TFT and explore its potential for validating P. R. Sarkar's Neohumanism (supporting the existential value as well as the utility value of all living beings and the inanimate world).

Keywords: Qualia, Tanmatra, Tanmatron Field Theory, Consciousness Studies, Mind-Matter Relation, Dual-Aspect Monism, Quantum Measurement Problem, EPR Paradox, Appropriative Points, Philosophy of Mind, Neohumanism.

1. Introduction and Background: The Historical Fracture

1.1 The Historical Fracture

The separation of mind and matter is an artifact of Western scientific methodology rather than an inherent feature of nature. To construct a predictable, mechanical model of the universe, early natural philosophers stripped physical matter of its felt, experiential qualities. Over centuries, this temporary methodological omission was mistaken for an ontological reality, leaving modern science with a fractured cosmos: an objective world of blind quantities and a subjective world of isolated, unexplainable qualities.

1.2 The Failure of Bottom-Up Reductionism

This foundational fracture forces contemporary physicalism to attempt an impossible feat: generating qualitative experience (the smell of a rose, the deep blue of the sky) from purely quantitative interactions of non-conscious particles. Conversely, standard dualisms fail to provide a rigorous, bidirectional mechanism showing how a non-physical mind can interact with physical tissue without violating energy conservation. Gauthier's Tanmatron Field Theory^{1,2} (TFT) addresses this impasse by proposing a unified framework in which mind and matter are co-equal, dual-aspect expressions of a singular underlying field sheet. By integrating P. R. Sarkar's *Ananda Sutram*³ concept of *tanmatras* (sensory inferences) with quantum field concepts, the experiential and physical aspects of reality are formally linked.

1.3 The Exile of Quality

The dualistic fracture began in the 5th Century BCE with ancient Greek atomism. Democritus asserted: *"By convention sweet is sweet, bitter is bitter, hot is hot, cold is cold, color is color; but in reality there are only atoms and the void"* [Fragment 9]. By declaring sensory experiences to be subjective artifacts generated when external atoms collide with sense organs, Democritus established a lasting precedent: physical science deals exclusively with objective, measurable quantities, while sensory qualities are exiled to the observer's mind.

1.4 The Mathematical Split

During the 17th-century scientific revolution, Galileo Galilei⁴ codified this split into the engine of empirical science, stating that the "Book of Nature" is written in the language of mathematics. For physics to achieve mathematical precision, it systematically excluded subjective sensations. Galileo posited that properties like shape, number, and motion remain stable without an observer, whereas smells, tastes, and colors reside within sensing consciousness.

René Descartes⁵ then formalized this split into a metaphysical dualism, dividing reality into two mutually exclusive substances:

- **Res Extensa (Extended Substance):** The physical world characterized by mass, extension, and spatial dimensions, governed by deterministic mechanical laws.
- **Res Cogitans (Thinking Substance):** The unextended, non-spatial mind where qualitative experiences, intentions, and raw qualia reside.

While this division allowed physical sciences to flourish, it created an explanatory vacuum: if matter is defined as devoid of subjective qualities, a physical brain can never logically generate or interact with conscious experience.

1.5 The Empirical Deadlock

As empiricism gained prominence, philosophers wrestled with the immediate epistemological consequence of the Cartesian split: how can we know an external physical world if our conscious minds only directly encounter internal sensations?

John Locke⁶ attempted to standardize the Galilean split by dividing material properties into Primary Qualities (size, shape, motion—objective and mind-independent) and Secondary Qualities (color, sound, taste—latent powers in the object to produce sensations in the observer). George Berkeley⁷ recognized a fatal flaw in Locke's formulation: it is impossible to perceive an object's primary qualities without simultaneously perceiving its secondary qualities. Primary and secondary qualities are ontologically inseparable. Because everything we experience is mediated by mind, Berkeley collapsed the physical world entirely, asserting *esse est percipi* ("to be is to be perceived.")

Rather than resolving the fracture, Berkeley's subjective idealism simply inverted it. Both physical reductionism and absolute mentalism fail because they view quantities and qualities as separate substances rather than co-dependent, dual-aspect expressions of a singular underlying cosmic order mediated by *tanmatras*, as described by P. R. Sarkar.

1.6 The Newton–Leibniz Impasse: An Early "Hard Problem"

The artificial split between physical quantities and mental qualities culminated in the celebrated Leibniz–Clarke Correspondence⁸ (1715–1716), indirectly between Isaac Newton and Gottfried Wilhelm Leibniz. In his 1704 *Opticks*⁹, Isaac Newton acknowledged a strict boundary: while he held that light consisted of material particles (*corpuscles*) that excited mechanical vibrations upon

striking the optic nerve, he recognized that these physical motions could never explain the subjective metamorphosis into color sensations inside the human *sensorium*. To bridge this gap, Newton relied on an immaterial soul present within a localized sensorium—and ultimately invoked an omnipresent "Sensorium of God" (absolute space) to govern physical interactions.

Leibniz rejected Newton's divine intervention, recognizing that a physical clockwork universe could never produce subjective feeling. To avoid the interaction problem, Leibniz¹⁰ proposed Pre-established Harmony—positing that mind and matter never interact, but run in parallel like two synchronized clocks.

Both titans reached an impasse because both operated on the flawed dualistic premise that mind and matter are independent, incompatible substances. Newton relied on divine intervention to cross the gap, while Leibniz erased mind-body interaction entirely. This historical failure foreshadowed David Chalmers' modern formulation of the "Hard Problem" of consciousness: any bottom-up physicalism that begins with dead, non-conscious matter possesses no logical mechanism to explain how quantitative brain states yield qualitative inner experience.

1.7 Transitioning from the Mechanistic Impasse to Sarkar's Living Cosmos

The historical reduction of nature by Democritus, Galileo, Descartes, and Locke succeeded in yielding a powerful mathematical physics, but it did so at a profound cost: it stripped natural science of its human face, replacing a living cosmos with a value-free, mechanistic, and dogmatically physicalist worldview. By banishing subjective qualities from the physical domain, Western science created the very ontological wall that has deadlocked consciousness studies for three centuries.

To dismantle this artificial split, modern science does not need another bottom-up materialist patch; it requires a fundamental paradigm shift that restores mind, quality, and value to the bedrock of physical reality. This is precisely what Prabhat Ranjan Sarkar achieved in his top-down, consciousness-first cosmology (*Brahmacakra*). By introducing *tanmatras* as the fundamental qualitative essences linking mental plate (*citta*) and physical wave frequencies—now formalized in quantum terms through Tanmatron Field Theory (TFT)—we replace the cold machine of classical physics with a unified, dual-aspect continuum where physical matter is recognized as condensed cosmic mind-stuff, inherently connected to conscious experience.

1.8 The Modern Impasse: Physicalism vs. Panpsychism

Mainstream science operates under the physicalist paradigm, attempting to explain consciousness as an emergent property of complex physical wiring. Despite advances in neuroimaging, physicalism remains bottlenecked as Chalmers' "Hard Problem" of consciousness¹¹: no amount of quantitative rearranging of physical matter can logically explain why or how structural mechanisms give rise to internal qualitative experience. Physicalism maps functional and behavioral correlates (the "easy problems") but leaves an unbridged explanatory gap.

To bypass this failure, contemporary panpsychism suggests that consciousness is a fundamental, ubiquitous feature of the universe, meaning elementary particles possess primitive mental

attributes. However, constitutive panpsychism suffers from the Combination Problem: if subatomic particles possess isolated micro-conscious perspectives, how do billions of these independent micro-experiences cleanly merge to form a single, macro-coherent conscious human self? Without an overarching field mechanism, panpsychism fragments into disconnected subatomic viewpoints.

1.9 Contemporary Quantum Biology: The Limits of Orch-OR

The most prominent scientific framework attempting to locate consciousness within physics is the Orchestrated Objective Reduction (Orch-OR) theory of Hameroff and Penrose¹². Orch-OR posits that consciousness emerges from quantum computations occurring within neuronal microtubules, where quantum superpositions of tubulin states collapse upon reaching a gravitational self-energy threshold ($E=\hbar/t$).

While Orch-OR advances quantum biology, it faces two major limitations:

1. **Biological Isolation and Decoherence:** Orch-OR confines consciousness to specialized biological structures, treating the rest of the universe as mechanical until life evolves. Furthermore, biological brains are warm and wet, leading standard quantum mechanics to predict rapid thermal decoherence (10^{-13} seconds) that would destroy quantum superpositions before macroscopic orchestration can occur.
2. **The Phenomenal Bonding Problem:** Orch-OR scales down the combination problem rather than solving it. It fails to explain how isolated micro-gravitational collapses across disparate cortical regions cleanly unify into a single macroscopic stream of consciousness without an underlying field substrate.

1.10 The Mirror Image: The “Hard Problem” of Advaita Monism

While physicalism fails to explain how mindless matter generates mind, classical Advaita Monism flips the paradigm, running into its own mirror-image dilemma. Advaita posits that *Brahman* (Pure, undifferentiated Consciousness) is the sole reality, while the objective physical universe is relegated to *Maya*—an illusion or superimposition (*adhyasa*).

This gives rise to Advaita’s Hard Problem: if ultimate reality is non-dual, changeless, and devoid of attributes (*Nirguṇa*), how and why does it differentiate into concrete physical laws, mathematical constants, and distinct individual minds? By dismissing physical matter as an ontological illusion (*vivartavada*), Advaita struggles to provide a predictive, testable account of material causality.

Physicalism and absolute idealism leave science at an impasse: physicalism treats quality as an accidental epiphenomenon of quantitative systems, while absolute idealism treats quantity as an illusion of a qualitative system. A unified research program must treat the mathematical rigor of physical fields and the qualitative architecture of sensory experience as co-equal, dual-aspect expressions of a single underlying continuum.

1.11 Transitional Frameworks and the Need for a Dynamic, Rational Realism

In seeking to bridge the gap left by classical physicalism, several important framework proposals have emerged as transitional efforts to reintroduce mind and consciousness into scientific discourse:

- **Constitutive Panpsychism:** In an attempt to avoid the sudden, miraculous emergence of mind from dead matter, constitutive panpsychism attributes primitive conscious elements to subatomic particles. However, it founders on the Combination Problem—it offers no logical mechanism to explain how billions of isolated micro-experiences in elementary particles could aggregate bottom-up into a unified, macroscopic human ego (*Aham*).
- **Penrose–Hameroff Orch-OR:** The Orchestrated Objective Reduction (Orch-OR) model represents a brilliant physical attempt to locate a non-computable quantum portal within neuronal microtubules. Yet, because it seeks to derive conscious moments (Orch OR) from objective gravitational wave-function collapses, it remains fundamentally a bottom-up physical mechanism that risks reducing subjective phenomenal experience to physical state reductions.
- **Classical Advaita Vedānta:** Advaita Monism correctly posits a top-down, consciousness-first ontology where ultimate reality is non-dual (*Brahman*). However, by historically categorizing the physical world as an illusory projection (*Māyā*), it lacks an objective, quantitative mechanics for sensory transformation and physical interaction, offering limited traction for empirical physics or laboratory testing.

While these models represent vital historical stepping stones away from dogmatic materialism, they remain incomplete. Moving past this transitional phase requires a dynamic, rational, and falsifiable consciousness-first paradigm—one that respects the objective reality of the physical universe without reducing mind to matter or dismissing matter as an illusion.

This is precisely what Prabhat Ranjan Sarkar achieved in his top-down cosmology (*Brahmacakra*—the Cosmic Cycle). By modeling physical matter as real, highly condensed cosmic mental plate (*Citta*) and introducing *tanmatras* as the sensory inferences linking mind and physical vibrations, Sarkar provides the missing mechanics. When formalized through the quantitative framework of Tanmatron Field Theory (TFT), this approach moves beyond metaphysical speculation, offering explicit field Lagrangians, topological phase-locking mechanisms, and empirical protocols capable of resolving foundational consciousness enigmas as well as quantum measurement paradoxes.

2. Nineteen Consciousness and Quantum Enigmas of Physicalism

To demonstrate the scope of the present research program, we outline nineteen foundational enigmas across the philosophy of consciousness and quantum foundations that currently stymie physicalist and traditional dualist frameworks:

1. **Descartes’ Mind-Body Interaction Problem:** How an unextended, non-spatial mind bidirectionally interacts with extended neural tissue without violating conservation laws.

2. **Chalmers' "Hard Problem" of Consciousness:** Why objective neurobiological processes give rise to internal, felt, qualitative subjective experiences.
3. **Locke's Inverted Spectrum:** Whether two individuals with identical brain states could experience completely inverted qualia (e.g., one seeing red where another sees blue).
4. **Searle's Chinese Room¹³ Argument:** The demonstration that quantitative syntactic symbol manipulation cannot generate semantic understanding or conscious awareness.
5. **Jackson's 'Mary's Room'¹⁴ Knowledge Argument:** Whether a neuroscientist with complete physical knowledge of vision gains new knowledge when experiencing color for the first time.
6. **Nagel's Bat Perception¹⁵ Anomaly:** The epistemological barrier preventing an external observer from mapping the intrinsic qualitative nature of a foreign sensory paradigm.
7. **Direct vs. Indirect Realism:** The divide between whether the mind directly encounters the external world or interacts only with internal neural simulations.
8. **The Neurophysiological Binding Problem:** How the brain unifies spatially distributed sensory streams (shape, color, sound, motion) into a cohesive perceptual event.
9. **The Challenge of AI Consciousness:** Determining whether complex silicon neural networks achieve authentic inner sentience or remain non-conscious symbol shufflers.
10. **Block's Absent Qualia¹⁶ / Philosophical Zombies Enigma:** The theoretical possibility of a functional, behavioral duplicate of a human that lacks inner qualitative awareness.
11. **The Evolutionary Enigma of Consciousness:** Why subjective awareness evolved if deterministic physical neural circuits can process information and execute survival behaviors without subjective awareness.
12. **Panpsychism's Combination Problem:** How independent micro-experiences of subatomic particles join to form a unified macroscopic human ego.
13. **Non-Local Awareness during Flatline Events:** Clinical reports of structured conscious awareness during deep anesthesia or near-death experiences (NDEs) with flatline EEGs.
14. **The Double-Slit Experiment & Wave-Particle Duality:** How physical measurement causes continuous wave interference to vanish into localized particle hits without invoking mystical observer intervention.
15. **The Copenhagen Measurement Problem:** The lack of a physical mechanism defining what triggers wavefunction collapse versus continuous Schrödinger wavefunction evolution.
16. **The Schrödinger's Cat Enigma:** The paradox of scaling quantum superpositions to macroscopic objects (living vs. dead cat quantum states).
17. **The Many-Worlds Interpretation (MWI) Exclusion:** The mathematical and thermodynamic implausibility of the universe branching into infinite parallel physical spacetimes at every decision point, in order to avoid any wavefunction collapses.
18. **The Einstein-Podolsky-Rosen (EPR) Paradox & Bell's Theorem¹⁷:** How entangled particles maintain instantaneous coordination across arbitrary spatial distances without violating Special Relativity or sending sub-luminal signals.
19. **The Misra and Sudarshan Quantum Zeno Effect¹⁸:** The mechanism by which high-frequency measurement pulses suppress quantum state transitions ("freezing" evolution) without introducing destructive thermal noise.

3. A New Metaphysical Foundation: Sarkar's Cosmic Architecture

To address these physicalist enigmas, we have adopted the cosmological framework of philosopher Prabhat Ranjan Sarkar's *Brahmacakra* (Cosmic Cycle), articulated in *Ananda Sutram* (1962).

Sutra 1-1 (*Śivashaktyātmakam Brahma*) establishes that ultimate reality, *Brahma* (Supreme Consciousness), is the inseparable unity of *Shiva* (the Cognitive Principle) and *Shakti* (the Operative Principle). Sutra 1-2 (*Śaktiḥ Sā Śivasya Śaktiḥ*) states that *Shakti* is the creative power subsidiary to *Shiva*, so that mental and material expressions result from Consciousness qualifying a portion of Itself.

Cosmic evolutionary flow comprises two consecutive movements: *Saincara* (top-down qualification and condensation of Supreme Consciousness into the Cosmic Mind and the physical universe) and *Pratisaincara* (bottom-up evolution of living physical bodies with minds that eventually merge back into Supreme Consciousness). During *Saincara*, under the qualifying influence of *Shakti's* three principles (*gunas*: sentient, mutative, static), Supreme Consciousness condenses into three concentric layers of Cosmic Mind:

1. **Cosmic Mahat (Cosmic Existential Feeling):** Pure Cosmic 'I exist' awareness.
2. **Cosmic Aham (Cosmic Doer/Ego):** Active Cosmic 'I do' awareness and volition.
3. **Cosmic Citta (Cosmic Mental Plate):** The densest mental layer, producing the physical universe as the Cosmic Mind's thought projection.

As condensation continues, *Cosmic Citta* solidifies into the five fundamental physical factors (*bhutas*): Ethereal (*Vyoma*), Aerial (*Marut*), Luminous (*Tejas*), Liquid (*Ap*), and Solid (*Ksiti*). Thus, the physical universe is a condensed expression within the Cosmic Mind.

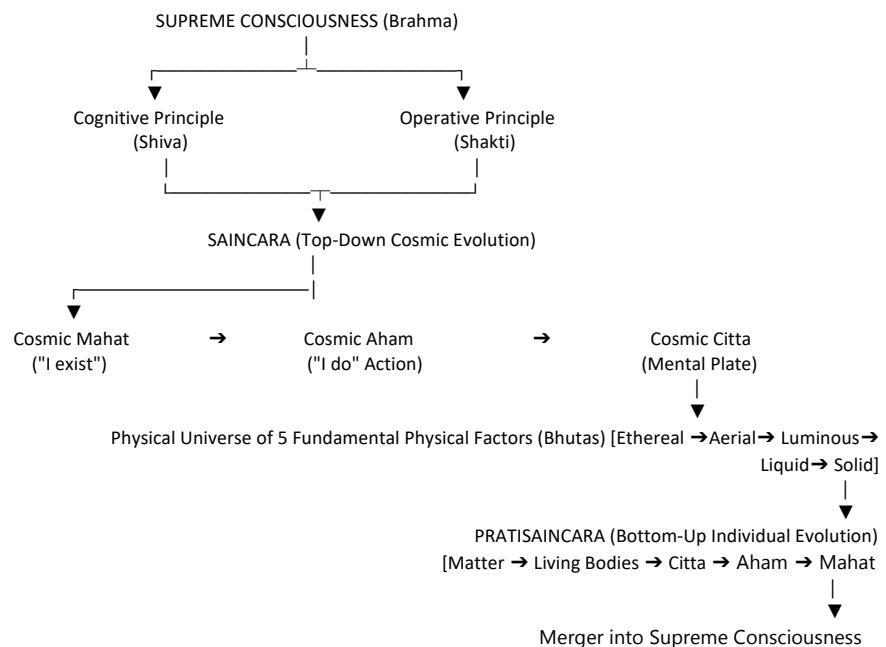


Diagram summarizing the Cosmic Cycle in the philosophy of Prabhat Ranjan Sarkar in *Ananda Sutram*

3.1 Individual Consciousness and Mind Architecture

Mirroring the macrocosm, the individual human mind consists of three concentric layers: individual *Mahat*, individual *Aham*, and individual *Citta*. The mind is illuminated by the top-down reflected individual consciousness (*Atman*), the reflection of Supreme Consciousness (*Purusha*) upon the individual mental mind.

Within this architecture, memory is bifurcated into two systems:

1. **Cerebral Memories (Physical Storage):** Data recorded within physical biological neural networks, acting as classical loops that simulate encountered frequencies.
2. **Extracerebral Memories (Samskaric Storage):** Stored as reactive potentials (*samskaras*) within the *Citta*, existing independently of neural tissue and surviving physical brain dissolution.

4. *Tanmatras* and the Tanmatron Concept: The Anatomy of Perception

Sarkar defines *tanmatras* as sensory inferences, inferential waves, or generic essences emitted from the five fundamental physical factors. They pass through the sense organs and sensory nerves into the mind, where they produce sensory qualia. Gauthier^{1,2} formalized this concept into Tanmatron Field Theory (TFT).

The fundamental unit of this framework is the tanmatron—defined as a dual-aspect quantum entity consisting of a physical vibration coupled to a mental *tanmatra*. The tanmatron does not create sensory qualities out of physical vibrations; it acts as a universal conduit for sensory essences via vibrations.

When the fundamental physical factors interact, they emanate physical vibrational waves carrying associated *tanmatras* (e.g., a photon carries the *tanmatra* for a specific color hue locked to the photon's specific vibrational frequency). These dual-aspect tanmatrons travel through space and enter biological sensory organs, propagating along the nervous system via sympathetic waves towards "appropriative points" (A-points). At these terminal coordinates, the tanmatron uncouples: its physical energy is conserved within the system, while its mental *tanmatra* creates vibrations in the mental plate (*Citta*). These vibrations are experienced by the ego (*Aham*) as qualia under the illumination of the *Atman*. See Figure 1 below.

4.1 Bypassing the Combination Problem

This top-down mechanism bypasses panpsychism's combination problem. Panpsychism attempts a bottom-up assembly of independent micro-consciousnesses. TFT operates in reverse: Cosmic Field Topology transitions to macroscopic fields, which focus through localized biological gateways (A-points). Biological brains do not generate consciousness; they act as tuned antennas that select, channel, and focus specific frequencies and *tanmatras* of the pre-existing tanmatron field.

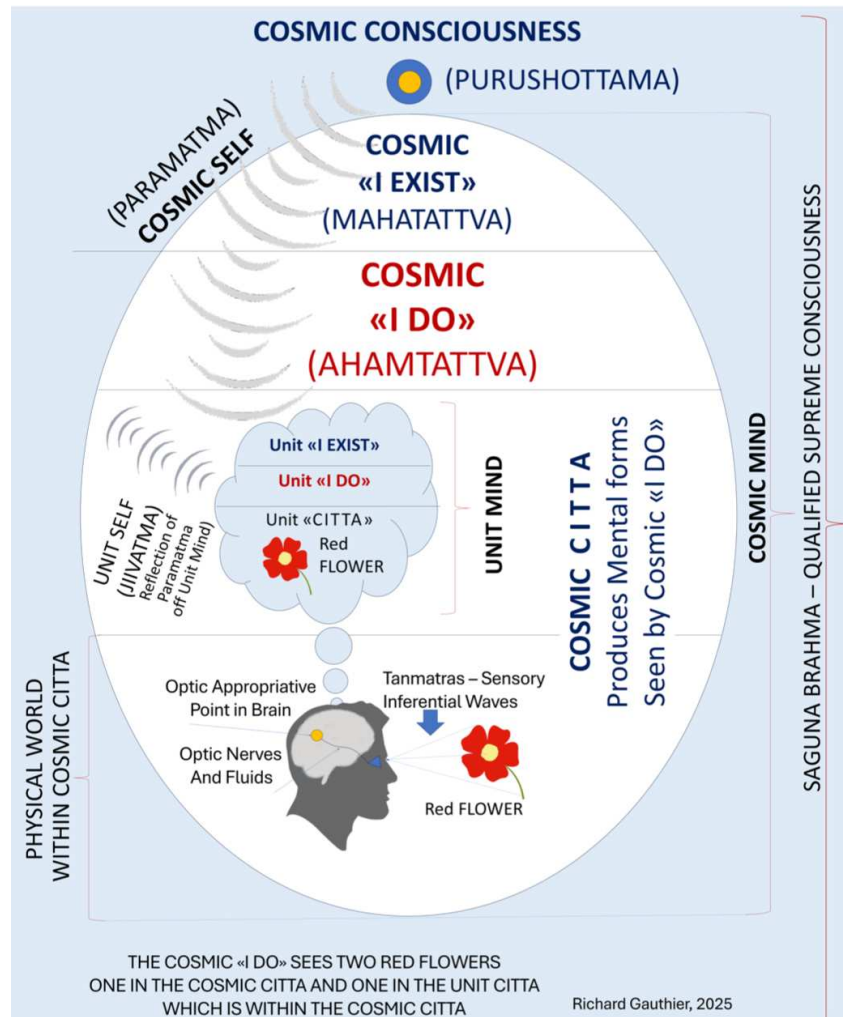


Figure 1. Graphic showing: Physical object (red flower) composed of five fundamental physical factors → *tanmatras* emanated → eye/sensory nerves → cortical A-point gateway to mind → *tanmatras* project onto the mind's unit *citta* (mental plate) → tanmatric vibrations in mental plate observed as red flower by *aham* (ego or "I do" feeling) in the presence of *mahat* ("I exist" feeling), *Atman* (unit self), and *Paramatman* (Cosmic Self or Cosmic Consciousness).

5. Theoretical Reinterpretation of the 13 Consciousness Enigmas

Applying Sarkar's philosophy of mind and *tanmatra* logic allows the 13 consciousness paradoxes to be addressed at a conceptual level:

1. **Mind-Body Problem:** Mind and matter are dual-aspect expressions of a single continuum. Physical vibrations carry mental *tanmatras* through physical media to the mental plate to create sensory qualia experienced by the *aham*, while outgoing *tanmatras* (mental intentions) enter motor nerves at motor A-points.
2. **Chalmers' Hard Problem:** The brain does not manufacture consciousness out of matter; it acts as a transceiver phase-locking onto a pre-existing tanmatron field.

3. **Locke's Inverted Spectrum:** Inverted qualia are ruled out because the relationship between a physical frequency and its mental *tanmatra* with its corresponding color or other sensory modality is fixed within the Mental Plate of the Cosmic Mind.
4. **Searle's Chinese Room:** Semantic understanding requires *tanmatras* linked to a *citta*, *aham* and *mahat* illuminated by consciousness. Silicon architectures process physical signals containing *tanmatras* but lack the receptive mental plate (*citta*) needed for producing qualitative experience.
5. **Jackson's 'Mary's Room':** Mary lacked the physical frequency range inputs phase-locked to specific colors. Experiencing color via *tanmatras* carried by photons in specific frequency ranges provided new phenomenal field coupling, giving her genuine new knowledge.
6. **Nagel's Bat Anomaly:** A bat's acoustic field contains frequencies outside human biological bandwidths. While humans cannot process these natively, translating those frequencies into human-accessible bands and *tanmatras* via simulated reality devices could provide a relative experience of bat perception—what it is like to be a bat.
7. **Direct vs. Indirect Realism:** *Tanmatras* support direct realism: human minds directly interact with the objective dual-aspect cosmic field via *tanmatras* transmitted through A-points, though external physical objects are themselves thought projections of the Cosmic Mind.
8. **Binding Problem:** Sensory features (sound, touch, color and form, taste and smell) are brought by *tanmatras* through distinct A-points to form vibrational patterns in the *citta*, which are unified by the multi-sensory processing capacity of the *aham*.
9. **AI Consciousness:** Silicon networks lack biological A-point gateways and mental layers (*citta*, *aham*, *mahat*), so they cannot transfer *tanmatras* to an individual mind to achieve inner sentience.
10. **Absent Qualia / Zombies:** Because physical vibrations and *tanmatras* are bound together by cosmic laws, identical physical bodies in identical field environments receive identical *tanmatra* inputs. A physical body lacking a mind would be a philosophical zombie, having nowhere to register and experience qualia, whereas a physical body having a human mind would register *tanmatras* and experience qualia normally.
11. **Evolutionary Enigma:** Subjective experience exists because cosmically-planned living beings evolved physical receptors and A-point interfaces to channel pre-existing *tanmatras* to produce sensory experiences, allowing living beings to perceive and navigate the physical universe.
12. **Panpsychism's Combination Problem:** During *Pratisaincara*, individual minds evolve bottom-up within the Cosmic Mind, as an internal balance of organized physical factors in their bodies produces single-celled life and minds when *cittanu* combine to form *citta*. Later, some *citta* evolves into *aham*, and some *aham* evolves into *mahat*, producing metazoic minds and finally human minds, each with its own *Atman*.
13. **Flatline Non-Local Awareness:** During near-death experiences or deep anesthesia, biological sensory pathways decouple, allowing the individual *citta* and mind to revert to its baseline field state illuminated by the *Atman*, preserving awareness, mental actions and the sense of existence.

6. Initial Phenomenological Formalism of Tanmatron Field Theory

To provide a framework for mathematical physics, Tanmatron Field Theory (TFT) is formulated as an *initial mathematical phenomenology*—a classically/semiclassically-coupled field model intended to guide future formalization rather than be a fully quantized theory.

6.1 The Five-Dimensional Tanmatric State Vector

TFT formalizes the five sensory essences (*tanmatras*) into a continuous, complex Five-Dimensional Tanmatric State Vector:

$$\Phi_{\text{Tanmatric}}(x^\mu) = [I_{\text{sound}}, I_{\text{touch}}, I_{\text{form}}, I_{\text{taste}}, I_{\text{smell}}]^T$$

where each component $I_n(x^\mu)$ represents the amplitude of a proto-sensory field component at spacetime coordinate x^μ .

6.2 Total Lagrangian Density

TFT expands the standard physical Quantum Field Theory Lagrangian density ($\mathcal{L}_{\text{QFT}}$) to include physical-mental field coupling:

$$\mathcal{L}_{\text{Total}} = \mathcal{L}_{\text{Physical}} + \mathcal{L}_{\text{Tanmatric}} + \mathcal{L}_{\text{Interaction}}$$

where the interaction term defines the coupling between physical quantum field fluctuations (φ) and the subjective state vector:

$$\mathcal{L}_{\text{Interaction}} = \kappa \varphi^2 (\Phi_{\text{Tanmatric}}^\dagger \Phi_{\text{Tanmatric}})$$

6.3 Formalizing the Law of Attributional Capacity

TFT formalizes Sarkar's *Ananda Sutram* (Sutras 1-8 and 1-10) into a strict conservation law. The sum of tanmatric intensities from the physical factors is normalized to an invariant maximum scalar value:

$$n = \sum I_n = I_{\text{sound}} + I_{\text{touch}} + I_{\text{form}} + I_{\text{taste}} + I_{\text{smell}} = C_{\text{Total}} = 100$$

This tracks the qualification of physical factors from the Ethereal factor ($\Phi_{\text{Ether}} = (C_{\text{Total}}, 0, 0, 0, 0)^T$) to the Solid factor ($\Phi_{\text{Solid}} = (I_{\text{sound}}, I_{\text{touch}}, I_{\text{form}}, I_{\text{taste}}, I_{\text{smell}})^T$), keeping cosmic capability perfectly conserved.

6.4 Physical Phase-Locking: Frequency and Quality

The qualitative type of subjective experience is specified by physical frequencies. For example, specific photon frequencies phase-lock onto coordinates within the proto-luminosity (I_{form}) field. When an electromagnetic wave traverses different physical media, its velocity and wavelength change with the refractive index ($n=v/v'$), but its frequency (f) remains invariant. Because

perceived quality remains invariant across media, subjective qualia are bound to physical frequency through cosmic phase-locking.

6.5 Empirical Inputs and Coupling Calculations

Subjective field magnitudes (I_n) are mapped using psychophysical frameworks like Stevens' Power Law:

$$I_n = k S^\psi = k (\phi^2)^\psi$$

This allows empirical psychophysical data to inform the calculation of the coupling constant κ :

$$\kappa(x^\mu) = (k [\phi(x^\mu)^2]^{(\psi-1)}) / \text{sqrt}(\sum |I_m(x^\mu)|^2)$$

6.6 Scope and Methodological Limitations

To evaluate TFT fairly, several mathematical and physical limits of this initial model must be explicitly noted:

1. **Phenomenological Status:** The current Lagrangian is a classical/semiclassical interaction proposal. It does not yet include a full second-quantization procedure, interaction vertices, propagators, or scattering amplitudes.
2. **Renormalization and Standard Model Integration:** Rigorous proof that $\mathcal{L}_{\text{Interaction}}$ maintains renormalizability, unitarity, and full Lorentz invariance at loop-level QFT remains to be developed in future work.
3. **Ontological Postulation:** Postulating $\Phi_{\text{Tanmatric}}$ does not "derive" qualia from purely quantitative equations; rather, it embeds proto-sensory (tanmatric) capacity as an intrinsic, dual-aspect property of the universe, placing qualitative capability on an equal footing with physical charge or mass.

7. Reinterpretation of Six Foundational Quantum Enigmas

By extending standard QFT with the dual-aspect vector $\Phi_{\text{Tanmatric}}$, TFT offers an alternative interpretation of quantum foundational dilemmas, recasting probabilistic jumps as deterministic field interactions.

7.1 The Double-Slit Experiment & Wave-Particle Duality

Unobserved physical field operators $f(x^\mu)$ evolve continuously according to $\mathcal{L}_{\text{Physical}}$, passing through both slits as a continuous wave sheet and producing an interference pattern ($I(x) = |f_1 + f_2|^2$). When a detector interacts with a path, it introduces the interaction term $\mathcal{L}_{\text{Interaction}}$. This triggers a Topological Phase-Locking Event, locking the physical phase angle θ_f to the background tanmatric vector $F(x^\mu)$. Constraining the phase causes destructive interference along the extended wavefront, rapidly projecting the continuous wave into a localized wave packet at the detector slit and eliminating interference fringes.

7.2 The Copenhagen Interpretation and the Measurement Problem

TFT replaces ad-hoc wavefunction collapse with deterministic Topological Phase Projection. A quantum system does not exist in an abstract mathematical void. When a physical wave field $f(x^\mu)$ interacts with a measurement device or a cortical A-point gateway, the interaction forces the physical wave fields to phase-lock onto the continuous, non-spatial tanmatric vector $F(x^\mu)$. The apparent "collapse" is the localized, deterministic crystallization of a dual-aspect wave packet as it synchronizes with the universal mind-field (*Citta*).

7.3 The Schrödinger's Cat Enigma

TFT demonstrates that macroscopic superpositions cannot persist. Under Sarkar's five-physical-factor cosmology (*Panca Bhutas*), a macroscopic organism is a dense, bound structure of physical factors continuously interacting with the non-spatial tanmatric continuum (*Cosmic Citta*). Microscopic phase-locking and environment-driven field projections occur continuously at atomic and molecular boundaries, meaning the chemical state of the poison vial and the biological state of the cat are localized long before macroscopic superpositions can form.

7.4 Exclusion of the Many-Worlds Interpretation (MWI)

MWI posits that the universe splits into infinite parallel physical spacetimes at every decision point. MWI is mathematically blocked in TFT on two counts:

1. **Conservation of Attributional Capacity:** Splitting the physical universe into infinite copies would divide, dilute, or violate the strict cosmic invariant ($\sum I_n = C_{\text{Total}} = 100$).
2. **Topological Singularity:** Spacetime in TFT is a derivative 4D projection from a singular higher-dimensional field sheet. Branching multiverses mistake derivative 4D projections for primary reality.

7.5 The Einstein-Podolsky-Rosen (EPR) Paradox & Bell's Theorem

While physical attributes are bound to 4D spacetime coordinates (x^μ), their subjective root operates within a non-local field topology. Entangled particles form a unified, topologically non-separable tensor product state in a 25-dimensional Hilbert space:

$$\Psi_{\text{Entangled}}(x^\mu) = \Phi_A(x^\mu) \otimes \Phi_B(x^\mu)$$

Because the subjective aspect of the tanmatron field operates independently of 4D spatial distance (d), instantaneous coordination during measurement accesses a localized expression of an already unified macro-cosmic mental field. Spacetime distance is revealed to be a 4D derivative projection of a fundamentally unified field sheet.

7.6 The Quantum Zeno Effect

The Quantum Zeno Effect—where frequent observation or measurement resets an unstable quantum state and prevents transition evolution—is reinterpreted in TFT as continuous Phase-

Locking Reset. Between measurements, the physical wave field $f(x^u)$ attempts free unitary evolution, drifting in phase. High-frequency measurement pulses or biological interactions force the physical phase angle θ_f back into tight alignment with the stationary tanmatric vector $F(x^u)$ ($\theta_f \rightarrow \theta_F$) via the interaction constant κ . High-frequency sampling acts as a continuous topological anchor, resetting physical phase drift before state transitions can accumulate, and dynamically freezing the system at the interaction coordinate.

7.7 The Completeness of the Six-Part Quantum Foundations Framework

It is important to emphasize that these six specific quantum enigmas (7.1–7.6) are not an arbitrary or incomplete selection of anomalies; rather, they represent the primary structural pillars that underlie all foundational paradoxes in quantum physics. Every quantum-foundations puzzle reduces mechanically to one (or a combination) of three core questions:

1. *What is the state of a quantum system prior to measurement?* (Answered by 7.1 Double-Slit Wave Propagation and 7.3 Macroscopic Superposition Limits).
2. *What exact dynamic occurs during measurement or observation?* (Answered by 7.2 Topological Phase Projection, 7.4 MWI Non-Splitting, and 7.6 Quantum Zeno Phase-Locking).
3. *How do spatially separated quantum states coordinate?* (Answered by 7.5 Non-Local Tensor Product Topology).

Because TFT establishes a single, unified mechanism—Topological Phase-Locking via $\mathcal{L}_{\text{Interaction}}$ —for these three core questions, secondary or compound quantum paradoxes are automatically subsumed and reinterpreted without requiring additional hypotheses:

- **The Delayed-Choice Quantum Eraser:** Erasing physical "which-way" path data in a detector circuit restores phase-coherence conditions across the dual-aspect field sheet before final registration, removing the illusion of retrocausality.
- **Wigner's Friend Scenario:** Objective measurement and field localization occur deterministically at the primary physical-to-tanmatric interaction boundary ($\mathcal{L}_{\text{Interaction}}$) inside the laboratory long before an external observer opens the door.
- **Elitzur–Vaidman Interaction-Free Measurement:** The physical wave mode $f(x^u)$ explores both spatial arms wave-wise, while phase-locking occurs exclusively along the blocked arm, allowing field topology to register presence without physical energy transfer.

Thus, resolving these six primary pillars provides a complete foundational framework that addresses the entire landscape of quantum measurement paradoxes.

8. Unification of Perceptual and Quantum Mechanical Enigmas

The reinterpretation of these perceptual and quantum mechanical enigmas suggests that Quantum Field Theory and Tanmatron Field Theory can be viewed as complementary components of a unified dual-aspect physics.

8.1 Complex Wavefunctions as Dual-Aspect States

In standard physics, the complex-valued nature of quantum wavefunctions ($\psi \in \mathbb{C}$) is treated as a calculating tool for probability densities ($|\psi|^2$). TFT grounds this structure in ontology:

- The **real physical amplitude** $f(x^\mu)$ represents the quantitative aspect of the field (energy, momentum, frequency).
- The **complex phase factor** $e^{i\theta}$ reflects structural coupling to the non-spatial 5D Tanmatric State Vector $\Phi_{\text{Tanmatric}}(x^\mu)$.

8.2 Comparison with Alternative Foundations

Unlike de Broglie–Bohm Pilot Wave Theory, which requires physical "empty waves" to persist eternally in configuration space, TFT postulates no dual physical entities; the physical entity is purely a wave field $f(x^\mu)$ coupled to the tanmatric vector field $F(x^\mu)$. Unlike standard environmental decoherence, which entangles particles with the environment into an infinite regress, coupling to F provides a non-regressive boundary condition where physical field projections map directly into subjective experience (*citta*).

8.3 Neuroanatomical Targets: Cortical A-Points

To make TFT empirically testable, the theory defines Appropriative Points (A-points) —biological gateways where physical wave signals (f) uncouple from their dual-aspect carriers and transfer *tanmatra* sensory essences (F) to the individual mental plate (*citta*). TFT predicts that A-points are located at primary thalamocortical entry layers where raw sensory pathways reach feedforward anatomical terminals ("geographical dead ends"):

1. Primary Visual Gateway (Layer IV of V1): Retinal signals routed through the lateral geniculate nucleus (LGN) terminate in sublayers IV α and IV β of the primary visual cortex (V1). Layer IV represents the pre-association entry boundary where raw retinotopic spatial maps remain uncorrupted by higher-order cognitive feedback.

2. Primary Auditory Gateway (Heschl's Gyrus / BA 41): Acoustic signals from the medial geniculate nucleus (MGN) terminate in Layer IV of Heschl's gyrus, providing a tonotopically mapped target for auditory *tanmatra* (I_{sound}) coupling.

3. Thalamocortical Radiations: The principal axonal trunks connecting subcortical sensory relays to primary cortices represent the obligatory bottleneck through which physical field frequencies must pass before mental field projection occurs.

8.4 The Anesthetic Interdiction Protocol

To physically test for the existence of A-points, TFT proposes an experimental protocol utilizing volatile anesthetics (Isoflurane, Xenon, Sevoflurane) combined with high-density local field potential (LFP) microelectrode arrays:

1. **Baseline Measurement:** Under conscious conditions, high-frequency physical wave impulses arriving at Layer IV of V1 or Heschl's gyrus correlate deterministically with concurrent subjective human qualia reporting.
2. **Anesthetic Interdiction:** Volatile anesthetic agents target hydrophobic pockets within neuronal microtubular tubulin states, disrupting the quantum/field coherence required to maintain the coupling constant κ .
3. **The Falsification Metric:** As anesthetic depth increases, LFP microelectrodes will record physical action potential trains arriving intact at their terminal Layer IV anatomical dead ends, yet subjective reporting of qualia drops to zero.

This selective decoupling would demonstrate that physical signal transmission to the cortex is a necessary, but insufficient, condition for conscious experience. The collapse of subjective awareness while primary physical signals remain intact pinpoints the exact spatial coordinates of the A-point gateway, providing physics and neuroscience with a testable protocol.

9. Conclusion: A Research Program for Consciousness Science

Tanmatron Field Theory should not be evaluated as a finished, definitive physical theory, but as a promising, unified research program that bridges the gaps between quantum mechanics, philosophy of mind, and subjective experience. By replacing bottom-up physical reductionism and top-down absolute idealism with a dual-aspect field architecture grounded in Prabhat Ranjan Sarkar's *tanmatra* cosmology, TFT offers a coherent framework to re-examine nineteen long-standing enigmas in consciousness studies and quantum foundations.

Crucially, TFT provides a bridge between physics and cognitive science by linking Quantum Field Theory with perception architecture. By replacing ad-hoc wavefunction collapse with deterministic Topological Phase-Locking between physical field modes (f) and the continuous tanmatric substrate ($\Phi_{\text{Tanmatric}}$), the theory offers a consistent narrative spanning wave-particle duality, EPR entanglement, the Quantum Zeno Effect, and sensory qualia registration. Furthermore, as demonstrated in Section 7.7, the six quantum resolutions establish a complete foundational set that naturally subsumes secondary measurement paradoxes such as Wigner's Friend and Delayed-Choice Eraser scenarios.

Moving forward, this research program requires development along two complementary tracks:

Theoretical and Mathematical Refinement: Formalizing the second-quantization of the interaction Lagrangian ($\mathcal{L}_{\text{Interaction}}$), deriving explicit propagators and scattering amplitudes, and proving renormalizability and Lorentz invariance within full QFT.

Empirical and Experimental Testing: Executing the proposed Anesthetic Interdiction Protocol across primary sensory gateways (Layer IV of V1, Heschl's Gyrus) to test for physical signal persistence during qualia suppression, thereby empirically evaluating the A-point hypothesis.

Finally, by defining the field dynamics of shared qualitative frameworks, TFT offers a conceptual foundation for Eco-Phenomenological Virtual Reality (VR) platforms—acting as an "empathy engine" to explore "what it is like" to perceive through foreign sensory paradigms. In doing so,

Tanmatron Field Theory serves as a structured, testable proposal to validate the universal, bio-ethical tenets of P. R. Sarkar's Neohumanism¹⁹ by technologically simulating non-human tanmatric experiences.

Appendix A: Clarifying the EPR Enigma Resolution through Dual-Aspect Field Topology

A.1 Conceptual Vacuum in Quantum Foundations

A common misconception is that formal quantum mechanics has fully "explained" the EPR paradox. In reality, standard QM accepts non-locality as a mathematical property. Bell's Theorem (1964) proved that no local hidden-variable theory confined to 4D spacetime can reproduce quantum correlations. Standard physics predicts these results mathematically but relies on competing interpretations (Copenhagen instrumentalism, Many-Worlds multiverses, or physical non-locality) to explain the underlying mechanism.

A.2 The Tanmatric Contribution

TFT addresses the EPR paradox by introducing three field-theoretic concepts:

1. **Non-Spatiality of the Subjective Vector:** Physical field aspects are bound by 4D relativistic spacetime coordinates (x^μ), but the subjective, qualitative aspect ($\Phi_{\text{Tanmatric}}$) is non-spatial. Entangled particles remain anchored to the same qualitative coordinate in the continuous mind-field, making instantaneous coordination a reflection of shared field topology rather than faster-than-light physical signaling.
2. **25-Dimensional Hilbert Space:** When two particles undergo entanglement, their individual 5D state vectors form a unified tensor product state:

$$\Psi_{\text{Entangled}}(x^\mu) = \Phi_A(x^\mu) \otimes \Phi_B(x^\mu)$$

This 25-dimensional Hilbert space acts as a single topological unit, revealing 4D spatial distance (d) to be a derivative projection of a higher-dimensional field sheet.

3. **Unification of Non-Locality and Qualia:** The field infrastructure that maintains non-local coordination across distance is the same continuous substrate that allows biological A-point gateways to gather scattered neural signals and project them as a unified conscious stream onto the individual mental plate (*citta*).

A.3 The Aquarium Analogy

Consider a deep-sea aquarium containing a single fish, observed via two 2D television monitors mounted on a wall—Screen A showing a front view and Screen B showing a side view. When the fish moves, the images on both screens move synchronously. An observer restricted to 2D screens might conclude that Screen A is communicating instantaneously with Screen B.

Standard quantum theory acts like an observer who says: "*The screens are correlated by a wavefunction; do not ask how.*" The *tanmatric* approach acts like an investigator who realizes: "*The two images look separate because you are viewing 2D projections of a 3D aquarium. There are not two entities communicating through space; there is only one fish.*" TFT supplies the continuous, higher-dimensional "aquarium"—demonstrating that apparent physical separation is a 4D shadow cast by a deeper, dual-aspect wholeness.

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