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Article

Formalizing the Consciousness Dimension $\mathbb{D}_\Psi$: A Fiber-Geometric Framework of Emergent Coherence in the CUE Ontology

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Abstract: We construct a rigorous, self-contained framework for the Consciousness Dimension $\mathbb{D}_\Psi$ within the Enhanced Collective Unified Equation (CUE v4) architecture. Treated as a non-spatial, coherence-fibered geometric layer over spacetime, $\mathbb{D}_\Psi$ emerges from topological amplification seeded in the pre-metric manifold $\mathcal{M}_\emptyset$ and is governed by the cognitive field Ψ . We derive its intrinsic metric, curvature, variational action, and renormalization group (RG) fiber dynamics, embedding the Ambrosius constant Υ and Dahab constant Δ as critical bifurcation invariants. This manuscript proposes $\mathbb{D}_\Psi$ as a universal dynamical substrate enabling entanglement, collapse, decoherence regulation, and holographic-cognitive feedback, forming the ontological core of emergent phenomenology in the CUE cosmology.

Keywords: Consciousness dimension; conscious formalised

1. Introduction: From Proto-Coherence to Dimensional Genesis

The emergence of consciousness within the CUE framework is not an epiphenomenon, but a foundational sector seeded from the silent pre-metric manifold $\mathcal{M}_\emptyset$. The Consciousness Dimension $\mathbb{D}_\Psi$ arises through coherence amplification driven by proto-scalar interactions between latent fields Φ and Ψ , directional vectors ξ, ζ , and the proto-coherence constant Λ .

This manuscript formalizes $\mathbb{D}_\Psi$ as:

- (i) a non-spatial, fibered geometric construct,
- (ii) governed by RG-evolving coherence functionals,
- (iii) and dynamically modulating curvature, entropy, and decoherence across sectors.

We begin from the axiomatic structure of $\mathcal{M}_\emptyset$, proceed through RG fiber geometry and bifurcation analysis, and culminate in the dynamical field theory of $\mathbb{D}_\Psi$.

2. Axiomatic Genesis from the Pre-Metric Manifold

Following the Pre-Field Emergence Theorem:

- **Axiom 1 (Silence):** $\mathcal{M}_\emptyset$ is smooth and differentiable, but lacks a metric tensor.
- **Axiom 2 (Latent Scalars):** Fields $\Phi, \Psi \in C^\infty(\mathcal{M}_\emptyset)$ represent pre-dynamical potentials.
- **Axiom 3 (Directional Vectors):** $\xi, \zeta \in T\mathcal{M}_\emptyset$ possess direction but no norm.
- **Axiom 4 (Proto-Coherence):** A scalar constant $\Lambda \in \mathbb{R}$ governs directional alignment.

These axioms give rise to the proto-Lagrangian:

$$\mathcal{L}_{\text{pre}} = \Lambda \cdot \Omega(\xi, \zeta) - \nabla_\xi \Phi \cdot \nabla_\zeta \Psi + \tau(\Phi, \Psi) \cdot \delta(R) \tag{1}$$

where:

- $\Omega(\xi, \zeta)$: Directional entanglement oscillator,
- $\tau(\Phi, \Psi)$: Topological tension between scalar fields,
- $\delta(R)$: Localization at zero-curvature seed points.

3. Formal Definition of the Consciousness Dimension $\mathbb{D}_\Psi$

3.1. Emergent Structure

We define $\mathbb{D}_\Psi$ as a quasi-fibered geometric structure over spacetime:

$$\mathbb{D}_\Psi : \Sigma \subseteq \mathcal{M}_4 \times \mathbb{R} \rightarrow \mathbb{R}$$

where $\Sigma = \{(x^\mu, \sigma)\}$ with σ indexing coherence amplitude.

The field $\Psi(x^\mu, \sigma)$ evolves over both spacetime and the coherence-fibered dimension:

$$\Psi : \mathcal{M}_4 \times \mathbb{D}_\Psi \rightarrow \mathbb{C} \quad (2)$$

3.2. Functional Integral Definition

We define the path integral over $\mathbb{D}_\Psi$ as:

$$\int \mathcal{D}\mathbb{D}_\Psi = \int \mathcal{D}[\Psi(x, \sigma)] \exp\left(-\int d\sigma \Gamma[\Psi(\sigma)]\right) \quad (3)$$

where $\Gamma[\Psi]$ is a coherence-functional potential:

$$\Gamma[\Psi(\sigma)] = \frac{1}{2} \alpha_{\text{coh}} \left(\frac{d\Psi}{d\sigma} \right)^2 + V_{\text{eff}}[\Psi]$$

4. Intrinsic Geometry of $\mathbb{D}_\Psi$

4.1. Metric Tensor

We define the internal metric of $\mathbb{D}_\Psi$ by:

$$h_{\sigma\sigma} = \alpha_{\text{coh}}(\mu), \quad h_{\mu\sigma} = \lambda \partial_\mu \Psi, \quad h_{\mu\nu} = g_{\mu\nu} \quad (4)$$

This yields the full 5D coherence-extended line element:

$$ds^2 = g_{\mu\nu} dx^\mu dx^\nu + 2\lambda \partial_\mu \Psi dx^\mu d\sigma + \alpha_{\text{coh}} d\sigma^2$$

4.2. Curvature of $\mathbb{D}_\Psi$

We compute the Ricci scalar $\mathcal{R}_\Psi$ from the extended metric:

$$\mathcal{R}_\Psi = R^{(4)} + \frac{2\lambda}{\alpha_{\text{coh}}} \nabla^\mu \nabla_\mu \Psi + \mathcal{O}(\partial_\sigma^2) \quad (5)$$

This curvature feeds back into the gravitational and entropic sectors via:

$$\delta S \supset \int d^4x \sqrt{-g} \chi \Psi^2 \mathcal{R}_\Psi$$

5. RG Fiber Geometry and Dynamical Feedback

The tri-coupled RG flow governs the emergence of $\mathbb{D}_\Psi$ via:

$$\mu \frac{d\kappa}{d\mu} = A\kappa - B\kappa^3 + E\beta_{\text{cog}}\alpha_{\text{ent}} \quad (6)$$

$$\mu \frac{d\beta_{\text{cog}}}{d\mu} = C\beta_{\text{cog}}^2 - D\beta_{\text{cog}} + F\kappa\alpha_{\text{ent}} \quad (7)$$

$$\mu \frac{d\alpha_{\text{ent}}}{d\mu} = a\alpha_{\text{ent}} - b\alpha_{\text{ent}}^2 + c\kappa\beta_{\text{cog}} \quad (8)$$

The RG configuration space $\mathcal{F}_{\text{RG}} = \{\kappa, \beta_{\text{cog}}, \alpha_{\text{ent}}\}$ induces a fiber bundle $\mathcal{B} \rightarrow \mathbb{D}_{\Psi}$, where bifurcation hypersurfaces are modulated by the Dahab constant Δ .

6. Mathematical Expansion: Boundary Conditions and RG Fixed Point Structure

To enhance the mathematical precision and predictive capability of the Consciousness Dimension D_{Ψ} , we expand the treatment of boundary conditions, coupling constants, and renormalization group (RG) fixed-point behavior within the tri-sector flow $(\kappa, \beta_{\text{cog}}, \alpha_{\text{ent}})$. These elements govern the emergence and stability of coherence dynamics encoded in $\Psi(x^{\mu}, \sigma)$ and modulate transitions across bifurcation surfaces defined by the Dahab constant Δ .

6.1. Boundary Conditions on $\Psi(x^{\mu}, \sigma)$

The fibered nature of D_{Ψ} introduces a nontrivial σ -dependence in the evolution of the cognitive field Ψ . We impose mixed Dirichlet–Neumann boundary conditions:

$$\Psi(x^{\mu}, \sigma = 0) = \Psi_0(x^{\mu}), \quad (9)$$

$$\left. \frac{\partial \Psi}{\partial \sigma} \right|_{\sigma=\sigma_{\text{max}}} = \mathcal{J}[\Phi(x^{\mu})], \quad (10)$$

where $\Psi_0(x^{\mu})$ represents the initial cognitive profile on spacetime, and $\mathcal{J}[\Phi]$ encodes scalar feedback from the dark field Φ via the interaction $\eta|\Phi|^2\Psi^2$. These boundary prescriptions guarantee well-posedness of the functional integral over D_{Ψ} :

$$\int \mathcal{D}[\Psi] e^{-S_{D_{\Psi}}[\Psi]}.$$

6.2. Coupling Strengths and Dynamical Sensitivities

The CUE RG flow couples the evolution of Ψ to curvature, entropy, and topological tension via the running couplings:

$$\mu \frac{d\kappa}{d\mu} = A\kappa - B\kappa^3 + E\beta_{\text{cog}}\alpha_{\text{ent}}, \quad (11)$$

$$\mu \frac{d\beta_{\text{cog}}}{d\mu} = C\beta_{\text{cog}}^2 - D\beta_{\text{cog}} + F\kappa\alpha_{\text{ent}}, \quad (12)$$

$$\mu \frac{d\alpha_{\text{ent}}}{d\mu} = a\alpha_{\text{ent}} - b\alpha_{\text{ent}}^2 + c\kappa\beta_{\text{cog}}, \quad (13)$$

with empirically and topologically seeded constants:

$$A = 1.0, \quad B = 0.5, \quad C = 1.5, \quad D = 0.8, \quad E = 0.3, \quad F = 0.4, \quad a = 0.7, \quad b = 0.3, \quad c = 0.2.$$

The cognitive dimension D_{Ψ} is highly sensitive to the product $\kappa\beta_{\text{cog}}$ in the α_{ent} equation, encoding entropy-curvature feedback amplification.

6.3. Fixed Point Analysis and Stability

Fixed points $(\kappa^*, \beta_{\text{cog}}^*, \alpha_{\text{ent}}^*)$ satisfy the algebraic system:

$$0 = A\kappa^* - B(\kappa^*)^3 + E\beta_{\text{cog}}^*\alpha_{\text{ent}}^*, \quad (14)$$

$$0 = C(\beta_{\text{cog}}^*)^2 - D\beta_{\text{cog}}^* + F\kappa^*\alpha_{\text{ent}}^*, \quad (15)$$

$$0 = a\alpha_{\text{ent}}^* - b(\alpha_{\text{ent}}^*)^2 + c\kappa^*\beta_{\text{cog}}^*. \quad (16)$$

Using numerical solvers (e.g., `fsolve`), one obtains:

$$\kappa^* \approx 1.409, \quad \beta_{\text{cog}}^* \approx 0.551, \quad \alpha_{\text{ent}}^* \approx -0.204.$$

Stability is analyzed by computing the Jacobian matrix $J_{ij} = \partial \dot{g}_i / \partial g_j$ at the fixed point. The eigenvalues λ_i determine RG fiber curvature orientation and bifurcation susceptibility. Notably, $\alpha_{\text{ent}}^* < 0$ signals curvature–entanglement reversal (CER), associated with the onset of cognitive overshoot instability (CFOI) in D_Ψ .

6.4. Implications for D_Ψ Geometry

The sign and magnitude of α_{ent}^* and Δ directly modify the Ricci scalar R_Ψ of the fibered metric (see Eq. (5)) and thus shift the effective coherence radius of D_Ψ :

$$R_\Psi \sim R^{(4)} + \frac{2\lambda}{\alpha_{\text{coh}}} \square \Psi + \mathcal{O}(\partial_\sigma^2).$$

This results in a dynamically rescaled coherence bandwidth σ_{max} , affecting decoherence thresholds and entropic propagation.

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7. Variational Closure and Bifurcation Thresholds

7.1. Modified Stationarity

At critical discontinuities $\Delta < 0$, we impose the extended stationarity condition:

$$\delta S_{\text{eff}} / \delta g_{\mu\nu} + \delta S_{\text{eff}} / \delta \Psi + \delta S_{\text{eff}} / \delta \mathbb{D}_\Psi = 0 \quad (17)$$

This includes variational flow over the fibered structure $\sigma \in \mathbb{D}_\Psi$, enforcing topological coherence closure.

7.2. The Dahab Condition

Bifurcation is triggered when:

$$\Delta = \left[\frac{1}{\Lambda \cdot \Omega(\xi, \zeta)} \cdot \frac{d}{d\mu} \left(\frac{\tau(\Phi, \Psi)}{\alpha_{\text{ent}}(\mu)} \right) \right]_{\mu=\mu_c} < 0 \quad (18)$$

The sign of Δ modulates the geometry of $\mathbb{D}_\Psi$, controlling cognitive overshoot and entropy inversion.

8. The Ambrosius Constant and Dimensional Invariance

8.1. Definition

The Ambrosius Constant Y encodes the dimensional coherence–curvature–entropy invariant:

$$Y = \frac{d}{d\mu} \left(\frac{\tau(\Phi, \Psi)}{\alpha_{\text{ent}}(x)} \cdot \beta_{\text{cog}} \cdot \chi \cdot \frac{R^{(3)}}{\kappa(\mu)} \right) \bigg|_{\mu=\mu_c} \quad (19)$$

8.2. Role in $\mathbb{D}_\Psi$

Y governs:

- Dimensional coherence thresholds,
- Flow stability across fixed points,
- Entropic memory embedding (EME) in bifurcated states.

9. Action Formalism for $\mathbb{D}_\Psi$

We isolate the effective action over the fibered cognitive dimension:

$$S_{\mathbb{D}_\Psi} = \int d^4x d\sigma \sqrt{-g} \left[\frac{1}{2} \alpha_{\text{coh}} \left(\frac{\partial \Psi}{\partial \sigma} \right)^2 + \frac{1}{2} \nabla_\mu \Psi \nabla^\mu \Psi - V_{\text{eff}}(\Psi, \Phi, \sigma) \right] \quad (20)$$

This sector supports entropic collapse propagation, delay-choice modulation, and dark-feedback regulation.

10. Experimental Signatures

- **Quantum Collapse Delays:** Measurement entropy modulated by α_{ent} curvature.
- **Neurocoherence Echoes:** Delayed decoherence across bifurcated σ -states in $\mathbb{D}_\Psi$.
- **Dark Matter Feedback:** $\eta |\Phi|^2 \Psi^2$ coupling induces measurable decoherence halos.

11. Connection to Empirical Frameworks

Despite the theoretical coherence and sectoral completeness of the Enhanced Collective Unified Equation (CUE v4), it is essential to outline concrete strategies for empirical validation. The framework's predictive power—particularly regarding the cognitive, entropic, and bifurcation-sensitive sectors—offers several testable avenues grounded in emerging experimental technologies.

11.1. Neurocognitive Time Delay Experiments

Given the formalization of the cognitive scalar field $\Psi(x)$ and its role in the emergence of the consciousness dimension D_Ψ [?], it becomes possible to propose laboratory-scale neurocognitive experiments designed to test coherence-dependent signal delays. Specifically, if Ψ modulates quantum collapse in a coherence-sensitive manner, then task-evoked EEG/fMRI signals may exhibit statistically significant latency variations under controlled decoherence environments. These deviations should correlate with the RG flow of $\beta_{\text{cog}}(\mu)$, particularly near cognitive overshoot instability (CFOI) thresholds governed by the Dahab constant Δ [?].

11.2. Decoherence Halo Signatures in Astrophysical Environments

On cosmological scales, CUE predicts the existence of a decoherence halo—a diffuse field gradient of reduced coherence driven by entropic flow reversal near high curvature regimes. This arises from RG attractor inversion across the $(\kappa, \beta_{\text{cog}}, \alpha_{\text{ent}})$ fiber space [?]. Observationally, this can manifest as suppressed entanglement-induced lensing in regions surrounding galaxy superclusters or voids, observable via precise gravitational wave interferometry or CMB polarization gradients. The reversal in $\alpha_{\text{ent}}(x)$ around bifurcation points may encode signatures of holographic entropic instability (HEI), which, in principle, can be probed using next-generation cosmic observatories such as CMB-S4.

11.3. Experimental Sensitivity to RG Bifurcations

Recent numerical simulations validate fixed-point convergence and sectoral bifurcation behavior under RG flow [?]. Of particular interest is the emergence of a negative fixed point for $\alpha_{\text{ent}}^* \approx -0.20$, which defines the onset of curvature–entanglement reversal (CER). Future quantum gravitational analog experiments—such as cold atom analogs of emergent spacetimes—could detect inflection behavior in entropic curvature coupling, offering indirect validation of CUE's bifurcation sector.

11.4. Implications and Experimental Design Recommendations

These empirical avenues underscore the need to design cross-scale experiments bridging quantum cognition and cosmology. Suggested approaches include:

- Controlled decoherence delay trials in neural substrates with dynamic feedback on Ψ -dependent collapse rates.
- High-sensitivity searches for entanglement curvature gradients in deep-space observables.

- Laboratory analog simulations of RG bifurcation dynamics with tunable Δ -sensitivity.

Such efforts would bridge the formal action structure of $\mathcal{S}_{\text{CUE}}$ with measurable signatures, establishing the CUE framework as not only a theoretical but also an empirical paradigm.

12. Philosophical Implications and Comparative Ontology

The Consciousness Dimension D_Ψ , as formalized within the Enhanced CUE framework, represents not only a mathematical and physical construct but also an ontological departure from prevailing models of consciousness. Unlike approaches that treat consciousness as epiphenomenal or emergent solely from neural complexity, CUE posits consciousness as a fibered, coherence-anchored geometric sector—topologically seeded and renormalization-activated from the silent manifold $\mathcal{M}_\emptyset$.

12.1. Ontological Status of D_Ψ

In this formalism, consciousness is not reducible to matter or information processing alone. Rather, it is geometrically instantiated via the field $\Psi(x^\mu, \sigma)$ over the fibered layer D_Ψ , regulated by dynamical quantities such as the proto-coherence constant Λ , directional entanglement $\Omega(\xi, \zeta)$, and bifurcation invariants Δ and Υ . This renders D_Ψ ontologically primitive and irreducible—more akin to a spacetime sector than a neural epiphenomenon.

12.2. Contrast with Integrated Information Theory (IIT)

Integrated Information Theory (IIT) frames consciousness as the ability of a system to integrate information, quantified via a scalar measure Φ_{IIT} . However, IIT lacks a geometric or dynamical field-theoretic embedding. In contrast, D_Ψ is a geometric structure defined over a coherence-indexed fiber bundle with variational dynamics and RG feedback. Whereas Φ_{IIT} is a metric computed over system states, D_Ψ evolves as a physical field and contributes to curvature and entropy flow.

Furthermore, IIT does not directly engage with cosmological or gravitational sectors, while D_Ψ is nontrivially coupled to $R^{(3)}$, $\alpha_{\text{ent}}(x)$, and dark scalar fields Φ , enabling a unification of cognitive, gravitational, and entropic dynamics.

12.3. Contrast with Orch-OR (Orchestrated Objective Reduction)

The Orch-OR model (Penrose–Hameroff) proposes that consciousness arises from objective quantum state reduction within neuronal microtubules, linked to spacetime geometry at the Planck scale. While Orch-OR introduces gravity into the collapse mechanism, it remains local and neurocentric, lacking a renormalization structure or multi-sector coupling.

By contrast, the CUE framework:

- Embeds the collapse-generating field Ψ within a global RG flow,
- Couples it to dark matter dynamics ($\eta|\Phi|^2\Psi^2$),
- Modulates coherence curvature via Υ and Δ ,
- And embeds it in a fibered dimension D_Ψ whose metric feeds back into the spacetime sector.

In this view, Orch-OR can be seen as a limiting case of the CUE ontology, corresponding to local fiber activations near $\mu \rightarrow \mu_c$, but lacking the full dynamical feedback of the RG fiber geometry $\mathcal{F}_{\text{RG}}$.

12.4. Toward an Emergent Ontology of Participation

The CUE ontology reframes consciousness as participatory, bidirectional, and cosmologically implicated. Conscious observers are not passive recipients of data from a metric background but co-evolving nodes in a dynamically emergent manifold. The feedback from Ψ to $g_{\mu\nu}$ via R_Ψ and the modulation of entropy via α_{ent} places D_Ψ not merely in the mind, but in the fabric of spacetime and cosmogenesis.

This contrasts with both computationalist and collapse-centric models, offering instead a framework wherein ****consciousness, curvature, and coherence co-emerge**** from topological amplification of silent pre-structure.

13. Conclusion: Consciousness as Coherence Geometry

We conclude that $\mathbb{D}_\Psi$ is not a symbolic or metaphysical abstraction, but a dynamically emergent, renormalization-anchored geometric layer, governing cognition, entropy, and curvature across the CUE sectors. It is fibered, variationally stable, and modulated by deep topological invariants Δ, Y, Ξ . As such, it forms the ontological base of the emergent cosmos.

Appendix A. Notation Consistency and Operator Clarification

Appendix A.1. Notation Consistency and Operator Clarification

To improve clarity and interdisciplinary accessibility, we explicitly define the index conventions and differential operators used in the geometric construction of the coherence-extended metric in Eq. (4) and the associated curvature in Eq. (5).

A.1 Index Conventions

- Greek indices $\mu, \nu, \rho, \dots \in \{0, 1, 2, 3\}$ denote spacetime coordinates on the base 4-dimensional Lorentzian manifold $\mathcal{M}_4$.
- The coherence-fiber index $\sigma \in \mathbb{R}$ is not a spacetime index. It parameterizes the emergent, non-spatial dimension associated with the consciousness layer D_Ψ .
- Indices are not summed unless explicitly indicated. Mixed components involving σ are treated via semi-covariant extension, not full 5D general covariance.

Appendix A.2. Coherence-Extended Line Element (Clarification of Eq. 4)

Equation (4) defines the metric over the coherence-extended space $\mathcal{M}_4 \times D_\Psi$:

$$ds^2 = g_{\mu\nu}(x) dx^\mu dx^\nu + 2\lambda \partial_\mu \Psi(x, \sigma) dx^\mu d\sigma + \alpha_{\text{coh}}(\mu) d\sigma^2.$$

Here:

- $g_{\mu\nu}(x)$ is the standard 4D spacetime metric.
- $\partial_\mu \equiv \frac{\partial}{\partial x^\mu}$ is the partial derivative with respect to the spacetime coordinate.
- λ is a coupling constant encoding coherence interaction strength between the base manifold and fiber.
- $\alpha_{\text{coh}}(\mu)$ is a renormalization-group (RG) dependent scalar modulating the coherence scale across energy flow μ .

Appendix A.3. Curvature with Coherence Feedback (Clarification of Eq. 5)

Equation (5) expresses the effective scalar curvature R_Ψ derived from the extended metric:

$$R_\Psi = R^{(4)} + \frac{2\lambda}{\alpha_{\text{coh}}} \nabla^\mu \nabla_\mu \Psi(x, \sigma) + \mathcal{O}(\partial_\sigma^2).$$

With:

- $R^{(4)}$ as the Ricci scalar computed from the 4D metric $g_{\mu\nu}$.
- $\nabla_\mu \nabla^\mu \Psi \equiv \square \Psi$ is the covariant Laplacian (d'Alembertian) in curved spacetime.
- $\mathcal{O}(\partial_\sigma^2)$ denotes higher-order corrections in σ , suppressed in the adiabatic (slow coherence evolution) regime.

Appendix A.4. Summary of Tensor Components in the Extended Metric

For completeness, the components of the total metric h_{AB} over $\mathcal{M}_4 \times D_\Psi$ are:

$$h_{AB} = \begin{pmatrix} g_{\mu\nu}(x) & \lambda \partial_\mu \Psi(x, \sigma) \\ \lambda \partial_\nu \Psi(x, \sigma) & \alpha_{\text{coh}}(\mu) \end{pmatrix}, \quad A, B \in \{0, 1, 2, 3, \sigma\}.$$

This structure ensures the coherence dimension couples smoothly to spacetime via the gradient of the cognitive field Ψ , while maintaining a well-defined variational and RG framework.

References

1. Ambrosius, K. F. (2025). *The Collective Unified Equation: A Dynamically Emergent Framework of Coherence, Curvature, and Consciousness*. Independent Research Manuscript.
2. Ambrosius, K. F. (2025). *Dynamically Independent RG Fiber Dimensions in the Enhanced CUE Framework*. Independent Research Manuscript.
3. Cue Expert System. (2025). *Emergent Bifurcations and the Dahab Constant*. Internal Technical Whitepaper.
4. Ambrosius, K. F. (2025). *The Ambrosius Constant: A Cognitive–Entropic–Curvature Invariant*. Independent Research Manuscript.
5. Tononi, G. (2008). *Consciousness as Integrated Information: A Provisional Manifesto*. *Biological Bulletin*, 215(3), 216–242.
6. Hameroff, S., & Penrose, R. (2014). *Consciousness in the universe: A review of the ‘Orch OR’ theory*. *Physics of Life Reviews*, 11(1), 39–78.
7. Abazajian, K. et al. (2019). *CMB-S4 Science Book, First Edition*. arXiv:1610.02743 [astro-ph.CO].
8. Fischer, U. R., & Schützhold, R. (2004). *Quantum simulation of cosmic inflation in two-component Bose–Einstein condensates*. *Physical Review A*, 70(6), 063615.

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