

Mandrov Unified Coherent Field Theory

Subjective Coherence as the Basis of Fundamental Interactions

Dmitry A. Mandrov

Independent Researcher, Russia

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Abstract

This paper presents a new theory — the Mandrov Unified Coherent Field Theory (MU-CFT), which unifies gravity, electromagnetism, weak and strong interactions based on the subjective coherence of the observer. Physical laws are considered a consequence of the principle of maximal continuity of subjective identity in the quantum multiverse. The theory incorporates gravitational geometry, phase structure, $SU(2)$ and $SU(3)$ symmetries related to coherence, and provides testable predictions in quantum physics and cognitive sciences.

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1 Introduction

This work proposes the Mandrov Unified Coherent Field Theory (MU-CFT), which unifies fundamental interactions based on subjective coherence. Motivations include the lack of an accepted Theory of Everything, the incompatibility between general relativity and quantum field theory, and the growing recognition of the observer's role in quantum interpretation.

We build on:

- General Relativity (Einstein, 1915)
- Quantum Field Theory (Dirac, Weinberg, etc.)
- Mandrov Coherent Field Theory (2025) as the basis of subjective dynamics
- Everett's Many-Worlds Interpretation

2 Coherence Field and Subjective Dynamics

We define the generalized coherence field:

$$\mathcal{C}(x^\mu, \phi^a)$$

where x^μ are spacetime coordinates, and ϕ^a are internal coherence parameters (phases, color, etc.).

Subjective action principle:

$$\delta \int \mathcal{C}(x^\mu, \phi^a) \sqrt{-g} d^4x = 0$$

3 Gravity as Geometry of Coherence

Field equations:

$$G_{\mu\nu} = 8\pi(T_{\mu\nu}^{\text{matter}} + T_{\mu\nu}^{(\mathcal{C})})$$
$$T_{\mu\nu}^{(\mathcal{C})} = \lambda \left(\nabla_\mu \mathcal{C} \nabla_\nu \mathcal{C} - \frac{1}{2} g_{\mu\nu} \nabla^\alpha \mathcal{C} \nabla_\alpha \mathcal{C} \right) - g_{\mu\nu} V(\mathcal{C})$$

4 Electromagnetism as Phase Coherence

Phase component:

$$\mathcal{C}(x^\mu, \theta), \quad A_\mu = \partial_\mu \theta$$

Gauge invariance: $A_\mu \rightarrow A_\mu + \partial_\mu \alpha(x)$

$$\mathcal{L}_{\text{EM}} = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu}$$

5 Weak Interaction as Coherence Branching

SU(2)-coherent spinor:

$$\Psi = \begin{pmatrix} \psi_1 \\ \psi_2 \end{pmatrix}$$

Mass mechanism as coherence branching entropy.

$$\mathcal{L}_{\text{weak}} = -\frac{1}{4}W_{\mu\nu}^a W^{a\mu\nu}$$

6 Strong Interaction as Color Cohesion

Color space:

$$\mathcal{C}(x^\mu, c^i), \quad c^i \in \mathbb{C}^3$$

Gluon field:

$$\mathcal{L}_{\text{strong}} = -\frac{1}{4}G_{\mu\nu}^b G^{b\mu\nu}$$

7 Unified Lagrangian and Subjective Unitarity

$$\mathcal{L}_{\text{total}} = \frac{1}{2}R - \lambda \nabla_\mu \mathcal{C} \nabla^\mu \mathcal{C} - V(\mathcal{C}) - \frac{1}{4}F_{\mu\nu} F^{\mu\nu} - \frac{1}{4}W_{\mu\nu}^a W^{a\mu\nu} - \frac{1}{4}G_{\mu\nu}^b G^{b\mu\nu} + \mathcal{L}_{\text{matter}}(\mathcal{C}, \Psi)$$

8 Dark Matter and Dark Energy as Latent Coherence Structures

In the framework of MU-CFT, the phenomena known as dark matter and dark energy may be interpreted as geometric consequences of coherence fields that are not phase-aligned with the observer's subjective continuity.

Dark Matter as Hidden Coherent Influence

Dark matter corresponds to latent coherence components $\mathcal{C}_{\text{latent}}$ that contribute gravitationally, but do not participate in the observer's subjective phase alignment. These structures influence spacetime curvature through gradients of coherence but remain invisible to direct interaction:

$$T_{\text{dark}}^{\mu\nu} = \nabla^\mu \mathcal{C}_{\text{latent}} \nabla^\nu \mathcal{C}_{\text{latent}} - g^{\mu\nu} V(\mathcal{C}_{\text{latent}})$$

This explains the gravitational lensing and rotational curves without requiring exotic particles.

Dark Energy as Decoherent Background Pressure

Dark energy may be modeled as a global pressure arising from accumulated decoherent configurations beyond the coherence horizon of the observer. As coherence weakens at cosmological distances, the remaining latent field exerts entropic pressure, expressed as:

$$\Lambda_{\text{eff}} \sim \langle \delta \mathcal{C}_{\text{decoh}}^2 \rangle$$

This pressure drives the accelerated expansion of the universe in directions where subjective coherence is no longer sustainable.

9 Conclusion and Philosophical Implications

MU-CFT:

- Unifies 4 interactions via subjective coherence
- Includes the observer within physical law
- Predicts cognitive-physical effects
- Serves as a Theory of Everything candidate

Physics is the navigation of subjectivity through the quantum multiverse.

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