

# Mandrov Coherent Gravity

A Subjective Coherence-Based Framework for Emergent Quantum Gravity

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## Abstract

This paper proposes an extension of the Mandrov Coherent Field Theory (MCFT) toward a model of quantum gravity. We hypothesize that gravitational geometry emerges from gradients in a scalar coherence field  $\mathcal{C}(x^\mu)$ , which represents the subjective coherence of an observer across quantum branches. The dynamics of spacetime and gravity arise not from mass-energy alone, but from the optimization of observer-centric coherence. The resulting framework connects general relativity, quantum decoherence, and information-based action principles.

**Keywords:** quantum gravity, subjective coherence, emergent spacetime, observer, modified Einstein equations

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# 1 Introduction

Mandrov Coherent Field Theory postulates that the observer's conscious trajectory preferentially follows quantum branches that maximize a functional of subjective coherence  $\mathcal{C}$ . We extend this idea to spacetime by proposing that coherence acts as a gravitational source, such that the geometry of spacetime reflects a statistical average over coherent observer paths.

## 2 Coherence as a Field

Let  $\mathcal{C}(x^\mu)$  be a scalar field defined over spacetime, representing the local density of subjective coherence. Regions with higher coherence correspond to stable, causally consistent experiences for the observer.

We propose a Lagrangian density of the form:

$$\mathcal{L} = \frac{1}{2}R - \lambda \nabla_\mu \mathcal{C} \nabla^\mu \mathcal{C} - V(\mathcal{C})$$

where:

- $R$  is the Ricci scalar,
- $\lambda$  is a coupling constant,
- $V(\mathcal{C})$  is a potential function.

## 3 Field Equations

Varying the action with respect to the metric  $g_{\mu\nu}$ , we obtain modified Einstein equations:

$$G_{\mu\nu} = 8\pi T_{\mu\nu}^{(\mathcal{C})}$$

where  $T_{\mu\nu}^{(\mathcal{C})}$  includes contributions from the coherence field.

## 4 Extended Formalism

### 4.1 Coherence Field Dynamics

The scalar field  $\mathcal{C}(x^\mu)$  evolves according to a Klein–Gordon-like equation derived from the action:

$$\square \mathcal{C} - \frac{dV}{d\mathcal{C}} = 0$$

where  $\square = g^{\mu\nu} \nabla_\mu \nabla_\nu$  is the d'Alembert operator.

### 4.2 Modified Energy-Momentum Tensor

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

### 4.3 Conservation Law

$$\nabla^\mu T_{\mu\nu}^{(\mathcal{C})} = 0$$

## 5 Interpretation of Gravity as Coherence Geometry

Gravity arises as a manifestation of optimal coherence structure. That is, the observed spacetime curvature encodes regions where observer trajectories converge under maximum subjective coherence.

## 6 Subjective Action Principle

We propose a coherence-optimized action:

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

This yields dynamics that select spacetime configurations maximizing coherent continuity of observer identity.

## 7 Conclusion and Outlook

This approach opens the door to:

- A subjective interpretation of gravitational fields,
- Coherence-based emergent spacetime,
- New approaches to the problem of quantum gravity,
- Compatibility with quantum information theory.

## Author Contributions

Dmitry A. Mandrov is the sole author of this work. All theoretical development, mathematical formulations, and conceptual ideas were independently developed by the author. GPT-4 (OpenAI) was used as a language assistant for formatting and phrasing.

## Conflicts of Interest

The author declares no conflict of interest.

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