A Fully Deterministic Structural Framework: Closed-Form Future Interval Prediction and Emergent Metric Generation

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Abstract

This paper presents the completed form of the unified structural framework based on the variables $(M, m, \gamma, B_{f1}, B_{f2})$, showing the closed-form expression for the future interval ΔT_{future} and the fully emergent metric tensor $g_{\mu\nu}$. The key result is that both the temporal evolution and geometric curvature emerge directly from the structural relation:

$$M(1+\Lambda) = \frac{8\pi G}{c^4} B_{f2},$$

which replaces the Einstein equation in structural form. This enables the derivation of explicit expressions for the coherence length, future interval narrowing via the multiplicity of m, and the collapse-based construction of the metric. All expressions require no free parameters or fitting, and arise purely from structural consistency.

1 Introduction

The structural framework is defined by the minimal variables $(M, m, \gamma, B_{f1}, B_{f2})$ and the phase consistency condition:

$$2m\gamma = 1. \tag{1}$$

Collapse dynamics, coherence length, and Tri-Arc geometry produce emergent spacetime behavior, allowing the derivation of c, $\hbar$, G, and the critical scale m_{crit} without fitting parameters. This work finalizes two essential components:

1. The **closed-form future interval equation**.
2. The **emergent metric tensor in explicit matrix form**.

2 Structural Replacement of Einstein's Equation

The structural analogue of Einstein's field equation is:

$$M(1+\Lambda) = \frac{8\pi G}{c^4} B_{f2}, \tag{2}$$

where

- M: global structural mass,
- Λ: background curvature factor,
- B_{f2}: negative structural field generating collapse and temporal direction.

This relation links curvature and collapse directly, forming the kernel for the future interval and metric generation.

3 Closed-Form Coherence Length

Using the structural Einstein relation, the coherence length becomes:

$$\delta r = K \left(\frac{c^4}{8\pi G} \cdot \frac{1}{M(1+\Lambda)} \right)^{1/2}, \tag{3}$$

where K is a dimensionless structural normalization constant (Tri-Arc).

4 Closed-Form Future Interval

The future interval has a two-layer structure.

4.1 Upper Layer: Directional Constraint

$$\Delta T_{L1} = K' \left(\frac{c^4}{8\pi G} \cdot \frac{1}{M(1+\Lambda)} \right)^{1/2}. \tag{4}$$

4.2 Lower Layer: Narrowing from the Multiplicity of m

Let

$$N_m = \frac{\sum B_{f1}}{B_{\text{earth}}},$$

then

$$\Delta T_{L2} = \frac{B_{\text{earth}}}{\sqrt{\sum B_{f1}}}. \tag{5}$$

4.3 Final Closed-Form Expression

Combining both layers yields:

$$\boxed{\Delta T_{\text{future}} = K' \left(\frac{c^4}{8\pi G} \cdot \frac{1}{M(1+\Lambda)} \right)^{1/2} \cdot \left(\frac{B_{\text{earth}}}{\sqrt{\sum B_{f1}}} \right)} \tag{6}$$

This expression requires no tuning or parameters, arising entirely from structural consistency.

5 Emergent Metric Tensor

Collapse acts as the generator of local geometric deformation. Let the collapse-induced deformation tensor be

$$\delta g_{\mu\nu} = A_{\mu\nu}\, \delta r^2, \tag{7}$$

where $A_{\mu\nu}$ is determined by Tri-Arc geometry.

Thus the full emergent metric is:

$$\boxed{g_{\mu\nu} = \eta_{\mu\nu} + A_{\mu\nu} \left(\frac{c^4}{8\pi G} \cdot \frac{1}{M(1+\Lambda)} \right)} \tag{8}$$

with $\eta_{\mu\nu}$ the Minkowski metric.

6 Conclusion

We have constructed the closed-form expressions for:

1. the structural future interval, and
2. the emergent metric tensor,

both derived solely from $(M, m, \gamma, B_{f1}, B_{f2})$ and the structural Einstein relation. This completes the deterministic formulation of spacetime and temporal evolution without free parameters.

References

[1] Kikuchi, T. (2026). Unified Structural Framework and Emergent Constants. (Unpublished manuscript).