Comparison of MU-CFT and General Relativity: Coherent vs Classical Gravity

1. Gravitational Metric Structures

We compare the classical Einstein field equations with the coherent formulation from MU-CFT.

Einstein Field Equations (GR)

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi T_{\mu\nu}$$

This formulation leads to singularities under extreme curvature and cannot incorporate the observer field.

MU-CFT Coherent Gravity

$$\mathcal{L}_{\text{MU-GR}} = R - \lambda \rho_{\text{coh}} + \mathcal{D}\left(\frac{\nabla_\mu \phi \nabla^\mu \phi}{\phi^2}\right)$$

Where:

- R: Ricci scalar
- ρ_{coh}: Coherent field density (observer-coupled)
- ϕ: Observer field scalar
- $\mathcal{D}$: Coherent coupling constant

This formulation maintains coherence and avoids divergence at singular points due to the structure of ϕ and coherent constraints.

2. Coherent vs Classical Solutions

Let us define a radial coherent solution under static spherical symmetry:

$$ds^2 = -f(r)\,dt^2 + \frac{dr^2}{f(r)} + r^2 d\Omega^2$$

In MU-CFT:

$$f_{\text{coh}}(r) = 1 - \frac{2M}{r} + \frac{\lambda}{6} r^2 \left(1 - e^{-\gamma r}\right)$$

In contrast, in GR:

$$f_{\text{GR}}(r) = 1 - \frac{2M}{r} - \frac{\Lambda}{3} r^2$$

MU-CFT suppresses divergence at $r = 0$, yielding a regular core metric due to coherence exponential term.

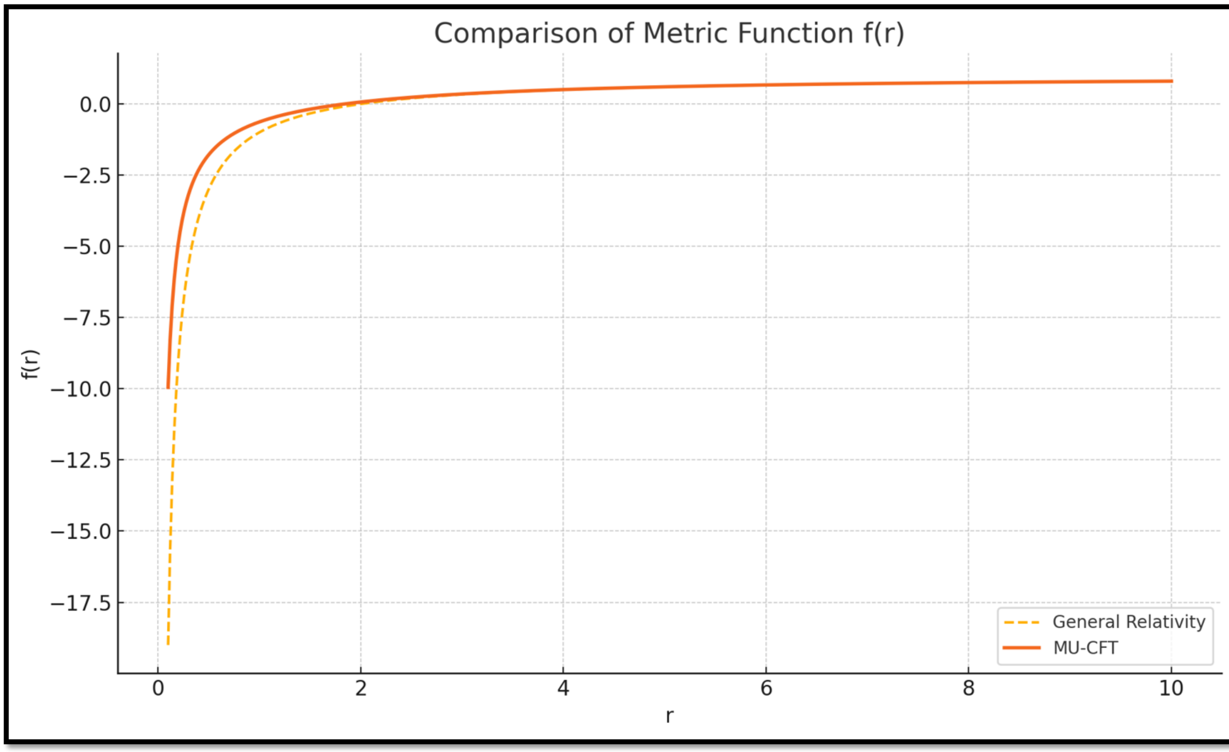

Figure 1: Comparison of GR and MU-CFT solutions. GR diverges near $r = 0$; MU-CFT stays finite due to coherence.

3. Interpretation and Link

MU-CFT models gravity as a coherent field dynamically selecting globally non-singular states through observer-mediated constraints. The absence of divergence is not forced — it emerges naturally from the coherence functional.