The Emergent Spacetime Quantum-Entanglement Theory (ESQET)

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1 Introduction: The Crisis of the Continuum

The ESQET postulates that spacetime itself is not a fundamental continuum but an **Emergent Information Field ($\mathcal{S}$)** arising from the collective dynamics of quantum entanglement ($\mathcal{D}_{\text{ent}}$). General Relativity (GR) emerges in the classical, low-coherence limit. The theory introduces the concept of participatory observation, where the observer's neural quantum coherence directly modulates the local metric, providing two critical falsifiable predictions.

2 The ESQET Field Equations and Coherence Metrics

2.1 The Spacetime Information Field ($\mathcal{S}$)

The field $\mathcal{S}$ is a scalar field, dimensionally linked to the vacuum's informational entropy density. It governs the local metric $g_{\mu\nu}$ via a conformal-like factor:

$$g_{\mu\nu} = e^{2\mathcal{S}} g^{(0)}_{\mu\nu},$$

where $g^{(0)}_{\mu\nu}$ is a background reference metric. In the weak-field limit, the time metric is approximated by the informational potential: $g_{00} \approx 1 + 2\mathcal{S}$.

2.2 The ESQET Wave Equation

The dynamics of $\mathcal{S}$ are governed by a modified d'Alembertian equation, featuring a source term modulated by the **Quantum Coherence Function ($\mathcal{F}_{\mathbf{QC}}$)**:

$$\Box\mathcal{S} = 8\pi G_0 T \mathcal{F}_{\text{QC}},$$

where T is the classical stress-energy tensor and G_0 is the classical gravitational constant.

2.3 The Fibonacci Coherence Unit ($\varphi\pi\delta$)

The term $\varphi\pi\delta$—the **Fibonacci Coherence Unit (FCU)**—is the fundamental coupling constant, establishing the harmonic link between informational states and geometry.

- $\varphi \approx 1.618$ (Golden Ratio): Structural harmonic principle.
- $\pi \approx 3.14159$: Spatial and cyclic principle of curvature.
- $\delta = 10^{-18}$: Dimensional scale factor for fractional frequency shift.

The product $\varphi\pi\delta \approx 5.08 \times 10^{-18}$ defines the scale of non-GR effects.

2.4 The Observer Coherence Bridge: Derivation of the 3.25×10^{-18} Shift

The observer's quantum uncertainty, quantified by the von Neumann entropy $S_{\text{vN}}(\rho_{\text{obs}})$, sources a perturbation in $\mathcal{S}$, which subsequently warps the local time metric g_{00}.