

The Theory of Everything: One Axiom, One Field, All of Physics

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Axiom: Distance necessitates time. Time is information. Information cannot be lost.

1 The Field

The scalar field:

$$G(t) = 10^{-3} + 10^{-4} \cos(2\pi t) \quad (1)$$

The field IS the quantum vacuum. The quantum vacuum IS spacetime. They were never separate. GR sees the field's large-scale gradient (spacetime curvature). QM sees the field's small-scale oscillation (vacuum fluctuations). Both see the same field, the same law, all scales.

2 The Correction Law (The Bridge)

$$X_{\text{eff}} = X_0 (1 + c_X G(t)) \quad (2)$$

This single law applies to all sectors:

Sector	X_{eff}	c_X	Domain
Decay	λ_{eff}	$Q_\alpha d_\alpha + Q_\mu d_\mu$	QM (nuclear)
Gravity	g_{eff}	$\sum f_i (d_\alpha + \beta_i d_\mu)$	GR (macroscopic)
Inertia	a_{eff}	same as time gradient	GR (macroscopic)
Fine structure	$\alpha(\phi)$	d_α	QM + GR (fundamental)
Mass ratio	$\mu(\phi)$	d_μ	QM + GR (fundamental)

Two free parameters (d_α, d_μ). All sectors. All scales.

3 What the Field Does

- Drives expansion ($H^2 \sim \rho_{\text{field}}$)
- Produces radiation (oscillation at large amplitude)
- Produces matter (vibration condensing into relics)
- Produces accelerated expansion (field at small amplitude)
- Modifies decay rates ($\lambda_{\text{eff}} = \lambda_0(1 + \alpha G)$)
- Modifies the time gradient ($g_{\text{eff}} = g_0(1 + \gamma G)$)

- Prevents singularities ($G \rightarrow \gamma^{-1}$ stops collapse)
- Preserves information (no singularities = no information loss)

4 The Quantum Vacuum Is Spacetime

The cosmological constant problem (10^{122} discrepancy) dissolves: the QM vacuum energy and the observed accelerated expansion are the SAME field measured at different scales. QM sees the field's zero-point oscillation (all modes). GR sees the field's macroscopic average (background). The discrepancy is an artifact of treating them as separate.

5 The Measurement Problem Dissolves

Superposition = field in undetermined state. Measurement = information resolves. Not collapse. Information resolution. The axiom forces the field's state to become definite when it interacts. No observer needed. No magic.

6 The Entropy Arrow Emerges

The field's equations are time-reversible ($dS/dt = 0$). Coarse-graining produces $dS/dt > 0$. The entropy arrow is a consequence of information preservation plus incomplete description.

7 $E = mc^2$ Backward

Forward: matter releases energy. Backward: energy condenses into matter.

- Fast vibration (high amplitude) = energy = radiation
- Slow vibration (low amplitude) = matter = relics
- The field damps: radiation era $\rightarrow$ matter era $\rightarrow$ expansion era

Matter is the field vibration slowed to the point of condensation. c^2 is the field's maximum vibration speed — the speed of light = the speed of information.

8 What This Resolves

Problem	Resolution
GR/QM unification	Same field, same law, all scales
Cosmological constant	Vacuum energy = field at small amplitude
Measurement problem	Information resolution, not collapse
Entropy arrow	Information preservation + coarse-graining
Black hole information	Relics preserve information (no singularity)
Big Bang singularity	Forbidden by the axiom
Hierarchy problem	Field couples to everything uniformly
Hubble tension	Field amplitude varies with environment

9 Conclusion

One axiom: distance $\rightarrow$ time $\rightarrow$ information $\rightarrow$ preserved. One field: $G(t)$. One law: $X_{\text{eff}} = X_0(1 + c_X G)$. All of physics.

The Theory of Everything is not a new force or a new particle. It is a new understanding of what already exists: the field IS. The field changes. Change IS time. Time IS information. Information cannot be lost. The field cannot end. There is only the field, changing, forever.