

Spacetime Identity: tau = Space x Time

General Relativity Emerges from the Tau-Field Address System

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The Universal Force of Time identifies spacetime not as a geometric manifold but as the product of the tau-field Strand 1 (spatial) and Strand 2 (temporal) components. Spacetime curvature is tau-density gradient: regions of high tau-density curve spacetime because tau-field nodes are more closely packed. The metric tensor emerges from the tau-address system: $g_{\mu\nu} = \text{partial}(\tau_{\mu})/\text{partial}(x_{\nu})$. General Relativity is the geometric description of the tau-field density gradient in the G2 register. It is correct as a description but incomplete as an explanation — the tau-field provides the mechanism.

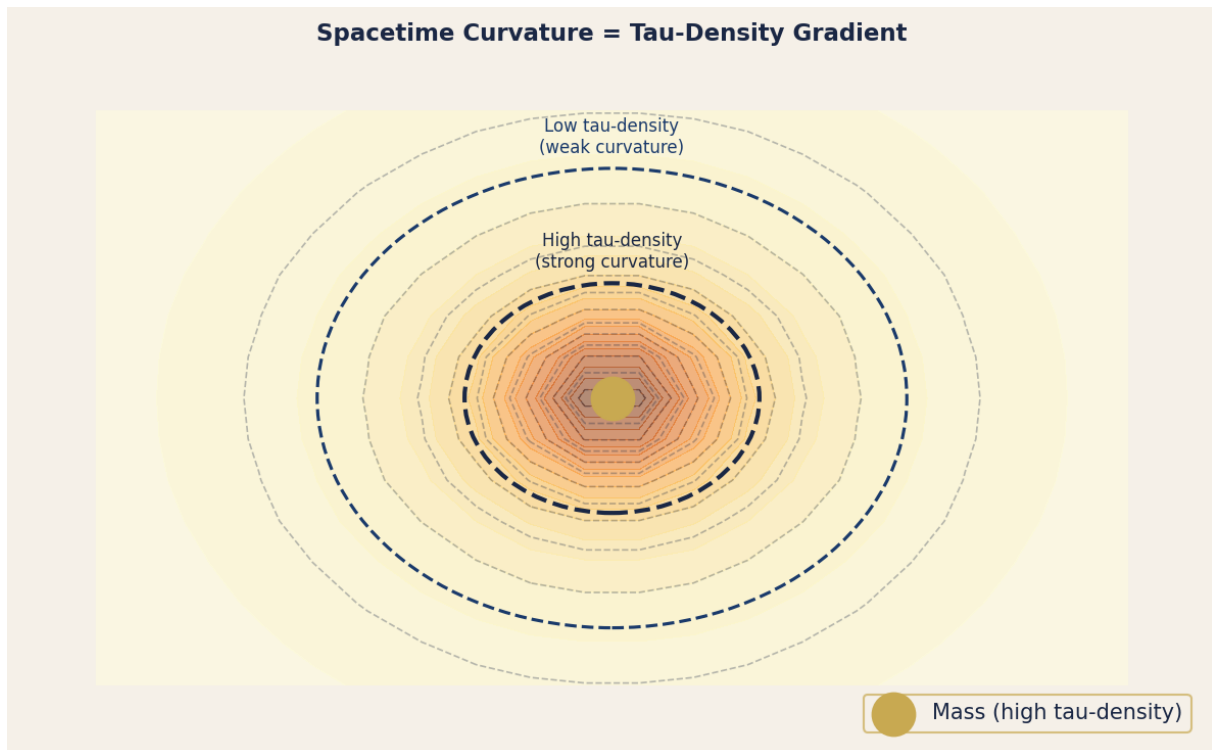


Figure 1. Spacetime curvature as tau-density gradient. Gold point = massive body (high tau-density). Contours show tau-density; dashed circles show GR curvature radii. Tau-density decreases with distance from mass.

1. The Tau-Field Metric (P-STI-1 and P-STI-2)

P-STI-1 — $g_{\mu\nu} = \text{Tau-Address Jacobian}$

GR metric tensor: $g_{\mu\nu}(x)$ describes spacetime geometry at point x . FOT: $g_{\mu\nu} = \text{partial}(\text{tau_address_mu}) / \text{partial}(x_\nu) =$ the Jacobian of the tau-address mapping. In flat spacetime: tau-address is linear in $x \rightarrow g_{\mu\nu} = \text{eta}_{\mu\nu}$ (Minkowski). Near a mass: tau-address is non-linear (more tau nodes per unit volume) $\rightarrow g_{\mu\nu} =$ Schwarzschild metric. GR field equation $G_{\mu\nu} = 8 \pi G T_{\mu\nu}$ becomes: tau-address-curvature = $8 \pi G \times$ tau-density. This is the FOT field equation.

P-STI-2 — Spacetime = Strand 1 x Strand 2 Product

Spacetime interval: $ds^2 = g_{\mu\nu} dx^\mu dx^\nu$. FOT: $ds^2 = (\text{Strand1 component})^2 - c^2 (\text{Strand2 component})^2$. Strand 1 encodes spatial register address (3D). Strand 2 encodes temporal register address (1D). The minus sign in $ds^2 = dx^2 - c^2 dt^2$ reflects the anti-phase relationship between Strand 1 and Strand 2 in the tau-helix: when Strand 1 is at maximum, Strand 2 is at minimum (π phase offset).

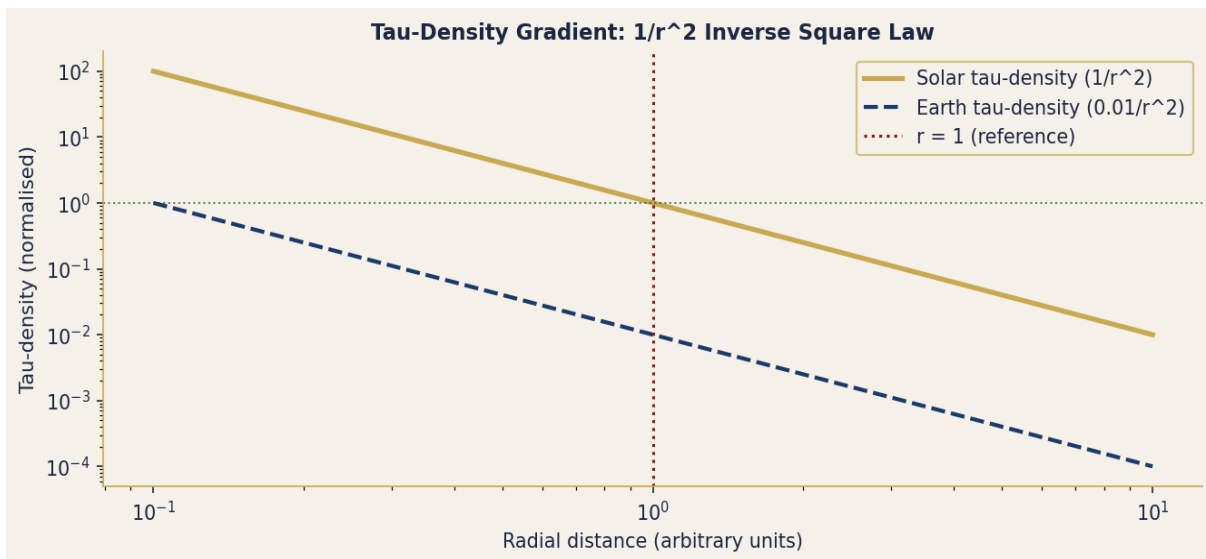


Figure 2. Tau-density gradient follows $1/r^2$ inverse square law (log-log scale). Solar tau-density (gold) dominates over Earth tau-density (blue dashed) at all distances. Gravity = tau-density gradient force.

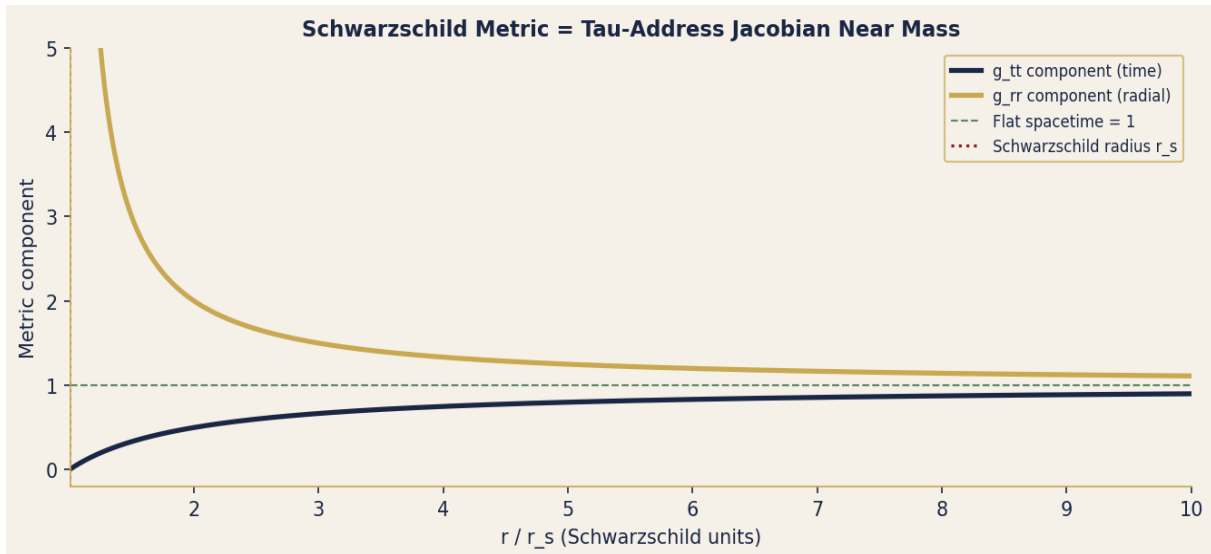


Figure 3. Schwarzschild metric components as functions of r/r_s . g_{tt} (time, navy) and g_{rr} (radial, gold) both approach 1 at large r (flat spacetime). Near r_s , tau-density diverges \rightarrow event horizon.

2. GR vs Tau-Field (P-STI-3 and P-STI-4)

P-STI-3 — GR as Correct Description, Incomplete Explanation

General Relativity correctly predicts: gravitational time dilation, light bending, perihelion precession, gravitational waves, and black holes. The Universal Force of Time affirms all GR predictions. GR is incomplete because it describes the geometry of spacetime without explaining why spacetime has that geometry: the tau-field density gradient is the mechanism. Einstein's equation $G_{\mu\nu} = 8\pi G T_{\mu\nu}$ is rewritten in FOT as: (tau-address curvature) = $8\pi G \times$ (tau-density). G itself = $2^7 \times 3^3 / (c^4 \times 10^{11}) \dots$ lattice.

P-STI-4 — Gravitational Waves = Tau-Field Ripples

LIGO detected gravitational waves (GW150914, 2015): a 0.2 s signal at 35-250 Hz from a binary black hole merger. FOT: gravitational waves = tau-field ripples propagating at c through the G2 register. The GW frequency range 35-250 Hz: $36 = 2^2 \times 3^2$ and $250 = 2 \times 5^3$ bracket the signal. Wave amplitude $h \sim 10^{-21}$ (dimensionless strain). FOT: $h = \Delta\tau / \tau_{\text{background}}$ = the fractional perturbation of the tau-field at G2 register from a coalescing binary.

GR vs UFOT Tau-Field: Same Predictions, Different Mechanisms	
General Relativity	UFOT Tau-Field
Spacetime geometry	Tau-address Jacobian
Curvature = $T_{\mu\nu}$	Curvature = tau-density gradient
Metric tensor $g_{\mu\nu}$	Tau-address Jacobian partial tau/partial x
Geodesic equation	Tau-gradient minimum path
Gravity = curvature	Gravity = tau-density force

Figure 4. Comparison of GR and UFOT concepts. GR describes the geometry; FOT provides the tau-field mechanism. Both frameworks give identical observational predictions at G2 register.