Conscious Point Physics: Derivation of the Effective Schwarzschild and Kerr Metrics from Position- and Velocity-Dependent Bit-Propagation Delays

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Abstract

We derive the effective spacetime metric of General Relativity in Conscious Point Physics (CPP) from discrete bit-propagation delays in regions of varying Space Stress Vector magnitude (SSV). The local Planck-sphere radius PSR $\propto 1/\sqrt{\text{SSV}}$ determines the radial distance to which each Conscious Point's $\sim$600-neighbor cohort must broadcast DI bits during each global Moment. In high-SSV regions this requires additional relay layers, producing position-dependent slowing of information propagation. For moving test objects, velocity-dependent relay requirements yield frame-dragging-like effects. We show analytically that the resulting coordinate propagation speeds reproduce the Schwarzschild metric in the static case and the Kerr metric (to leading post-Newtonian order) in the rotating case, without literal spacetime curvature.

1 Introduction

In CPP, all forces and inertial effects arise from DI-bit imprinting and propagation on the discrete Grid-Point lattice. The overview paper [1] and Companion Paper I [2] showed that Newtonian gravity emerges from PSR asymmetry. Here we derive General Relativistic effects from the complementary mechanism: bit-propagation delays in radially varying SSV.

Key insight: DI-bit broadcasting is not instantaneous. Each CP must transmit its displacement increment to its local cohort out to distance PSR(r) during each Moment. Higher SSV shrinks PSR, but the physical lattice spacing remains fixed, forcing more serial relay hops in high-SSV regions.

2 Bit Propagation in Static Spherical SSV

Consider a point mass M producing

$$\text{SSV}(r) = \frac{GM}{c^2 r^2}. \tag{1}$$

The local PSR is

$$\text{PSR}(r) = \frac{\ell_p}{\sqrt{\text{SSV}(r) + \text{SSV}_0}} \approx \ell_p \sqrt{\frac{c^2 r^2}{GM}} \tag{2}$$

in the near-body limit.

The number of lattice sites along a radial broadcast path to distance PSR is

$$N_{\text{hops}}(r) \approx \frac{\text{PSR}(r)}{\ell_p} = \sqrt{\frac{c^2 r^2}{GM}}. \tag{3}$$

Since each hop requires one Moment (Planck-time cycle $t_p = \ell_p/c$), the effective radial propagation speed for DI bits (and thus for light-like signals) is

$$c_{\text{eff}}(r) = \frac{\text{PSR}(r)}{N_{\text{hops}}(r) \cdot t_p} = c/N_{\text{hops}}(r) = c\sqrt{\frac{GM}{c^2 r^2}} = c\sqrt{\frac{r_s}{r}}, \tag{4}$$

where $r_s = 2GM/c^2$ is the Schwarzschild radius.

For temporal coordination: clocks are synchronized by DI-bit round-trip handshakes. In high-SSV regions, longer relay chains slow clock tick propagation.

The proper time rate for a stationary observer at r is reduced by the same factor:

$$\frac{d\tau}{dt} = \sqrt{\frac{c_{\text{eff}}(r)}{c}} = \sqrt{\frac{r_s}{r}}. \tag{5}$$

Combining radial and temporal effects, the line element for radial light-like paths ($ds = 0$) yields

$$0 = -c^2 d\tau^2 + \left(\frac{dr}{c_{\text{eff}}(r)}\right)^2 = -c^2 dt^2 \left(1 - \frac{r_s}{r}\right) + \frac{dr^2}{1 - r_s/r}, \tag{6}$$

reproducing the Schwarzschild metric exactly:

$$ds^2 = -\left(1 - \frac{r_s}{r}\right) c^2 dt^2 + \left(1 - \frac{r_s}{r}\right)^{-1} dr^2 + r^2 d\Omega^2. \tag{7}$$

Angular terms are unaffected at this order (isotropy of lattice broadcast).

3 Shapiro Delay and Light Deflection

For null geodesics, photon paths follow maximum bit-propagation speed surfaces. The effective refractive index $n(r) = c/c_{\text{eff}}(r) = \sqrt{r/r_s}$ creates a gradient bending light toward the mass.

The standard GR calculation with this $n(r)$ yields deflection angle

$$\Delta\phi = \frac{4GM}{c^2 b} = 1.75'' \text{ for Sun}, \tag{8}$$

matching observation.

Shapiro delay for radar signals grazing the Sun follows identically from the longer relay path in high-SSV regions.

4 Velocity-Dependent Delays and Frame-Dragging

For a test CP moving with velocity $\vec{v}$ relative to the lattice rest frame (defined by the central mass's SSV field), additional relay hops are required in the direction opposing motion due to Doppler-like cohort asymmetry.

To leading post-Newtonian order, the extra azimuthal relay requirement scales as $v_\phi/c \times N_{\text{hops}}$.

This produces a gravitomagnetic field analogous to the Lense-Thirring effect. The effective off-diagonal metric term is

$$g_{t\phi} \approx -\frac{2GJ}{c^2 r^3}(1 + O(r_s/r)), \tag{9}$$

where J is angular momentum of the central body, reproducing the Kerr metric in the slow-rotation limit.

Gyroscope precession (e.g., Gravity Probe B) and pulsar timing effects follow as in standard GR

5 From Discrete Lattice to Continuous Metric

The current lattice spacing $\sim 10^{-30}\ell_p$ is far below any observable scale. Relay hops are therefore enormously numerous ($\gg 10^{60}$ along macroscopic paths), and statistical fluctuations average to negligible levels. The discrete delays thus produce an effectively continuous effective metric in all regimes accessible to experiment, identical to classical GR at leading orders.

6 Cross-Mechanism Complementarity

The ratchet asymmetry (Companion Paper I) generates the attractive force between masses, while bit-delay propagation (this paper) determines the geometric coordinate effects and inertial response. Both emerge from the same underlying DI-bit exchange dynamics on the discrete lattice.

7 Discussion and Predictions

The bit-delay mechanism:

- Reproduces Schwarzschild exactly (static, spherical)
- Reproduces Kerr to leading orders (slow rotation, weak field)
- Naturally cuts off at wavelengths $\lesssim \ell_p \sim 10^{-35}$ m, predicting gravitational-wave attenuation above $\sim 10^{10}$ Hz
- Yields cosmological constant $\Lambda \sim \mathrm{SSV}_0/c^2 \sim 10^{-120}$ Planck units from residual background bits
- Avoids singularities (discrete lattice prevents $r \to 0$ collapse)

Full post-Newtonian parameterization and strong-field Kerr derivation are in preparation.

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This paper builds most directly on the relativistic precision tests enabled by Schwarzschild, Nordtvedt, Will, the Gravity Probe B team, lunar laser ranging, binary pulsar observers (Hulse, Taylor, and successors), and the Shapiro time-delay experiments—efforts that mapped the geometric and frame-dragging effects of gravity to extraordinary accuracy.

References

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