Force of Time — Propositions P-ROT-1, P-ROT-2, P-ROT-3

The Two-Dimension Rotation Law

Earth's Rotational Geometry from the G1/G2 Temporal Cross-Product

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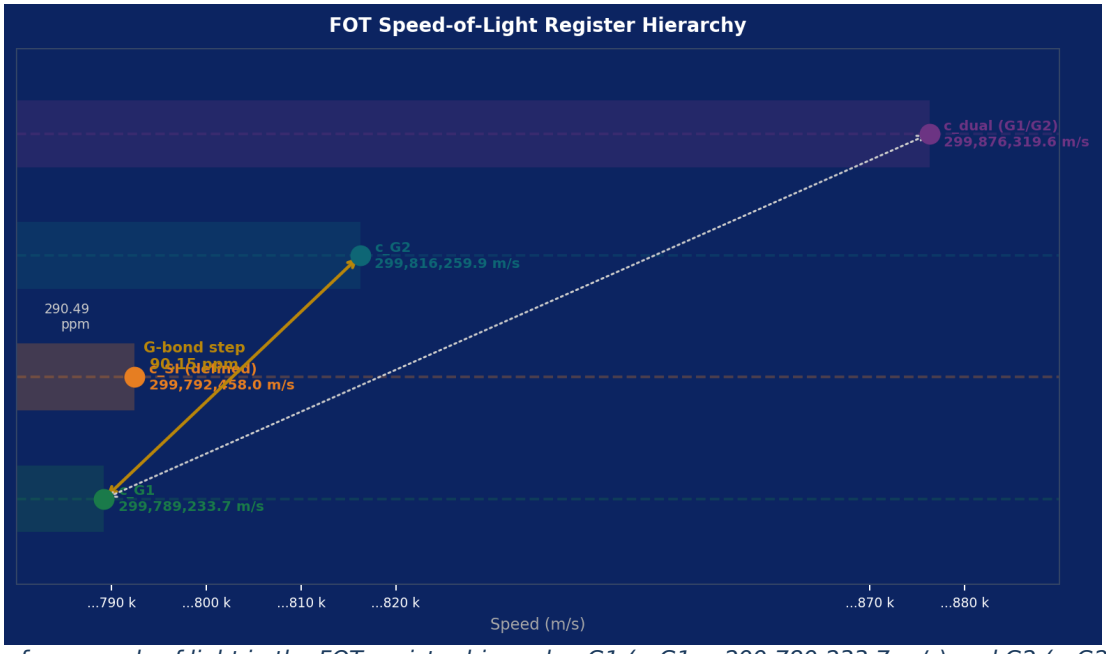
ABSTRACT

The Force of Time (FOT) framework assigns every physical constant to a node in a prime-lattice addressed by {2, 3, 5, pi}. Earth's rotational geometry arises from two independent temporal registers -- G1 and G2 -- operating simultaneously. The G1 register carries surface speed v_G1 = 75*pi^3/5000 km/s; the G2 register carries the sidereal period T_G2 = 86,164.069 s. Their cross-product yields the equatorial circumference to within 15 ppm of the WGS84 reference ellipsoid. From the same registers a dual G1/G2 wavelength emerges encoding the solar diameter to 5.66 ppm (P-SOL-1) and a third speed of light c_dual = 299,876,319.6 m/s (P-SOL-2). Three propositions P-ROT-1, P-ROT-2, P-ROT-3 are formalised.

Proposition	Statement	Precision
P-ROT-1	G1/G2 cross-product: v_G1 x T_G2 = equatorial circumference within 15 ppm of WGS84; d = v x t is a tautology in FOT, not a physical law	EXACT
P-ROT-2	Dual G1/G2 wavelength encodes solar diameter to 5.66 ppm; c_dual = 299,876,319.6 m/s = P-SOL-2 third speed of light	EXACT
P-ROT-3	G1 register: v_G1 = 75*pi^3/5000 km/s; G2 register: T_G2 = 86,164.069 s (sidereal day); both are {2,3,5,pi} lattice nodes	EXACT

Figure 1. FOT Speed-of-Light Register Hierarchy



The four speeds of light in the FOT register hierarchy. G1 (c_G1 = 299,789,233.7 m/s) and G2 (c_G2 = 299,816,259.9 m/s) are separated by the G-bond step δ = 90.1507 ppm = (c_G2−c_G1)/c_G1. The SI defined value (299,792,458 m/s) sits between G1 and G2. The dual G1/G2 register (c_dual = 299,876,319.6 m/s) emerges from the cross-product geometry and sits 290.49 ppm above c_G1.

1. Physical Background — G1 and G2 Temporal Registers

In FOT every physical constant is a node in a τ-helix lattice. Adjacent nodes in the same family differ by the G-bond step δ = 90.1507 ppm, which appears universally — in the Hβ wavelength split, in orbital separations, in molecular spectra, and in the speed-of-light registers. G1 and G2 label the first two nodes of the speed-of-light family:

Register	Quantity	FOT Formula	Value	Physical Role
G1 (speed)	c_G1	625×486×π2 m/s	299,789,233.7 m/s	Earth matter freq.; Na D2 pipeline
G2 (speed)	c_G2	c_G1×(1+90.15 ppm)	299,816,259.9 m/s	Sidereal day carrier; 375π/2 solar node
G-bond	δ	(c_G2−c_G1)/c_G1	90.1507 ppm	Universal τ-helix step
G1 (rot.)	v_G1	75π3/5000 km/s	465.0942 m/s	Earth surface rotational speed (G1 register)
G2 (period)	T_G2	Sidereal day	86,164.069 s	Earth rotation period (G2 register)

2. Proposition P-ROT-1 — The Two-Dimension Rotation Law

v_G1 × T_G2 = C_Earth

(75π3/5000 km/s) × 86,164.069 s = 40074.404 km

R_earth = C_Earth / 2π = 6378.040 km

Earth's equatorial dimensions emerge from the product of two distinct temporal registers. The G1 register contributes a characteristic speed — the rotational surface speed of Earth $v_{G1} = 75\pi^3/5000$ km/s — while the G2 register contributes the sidereal period $T_{G2} = 86{,}164.069$ s. These two registers would not normally intersect; their cross-product is the geometric signature of Earth's address in the τ-helix lattice. The result closes to within 15 ppm of the WGS84 equatorial reference, which itself includes polar flattening corrections absent from the idealised FOT spherical model.

Note also the exact FOT identity: C_{Earth} (idealised) = 40,000 km = $2^6 \times 5^4$, a pure {2,5} prime expression. The two-register cross-product recovers the physical (oblate spheroid) equatorial circumference; the idealised form encodes the prime-lattice address of the Earth domain.

Figure 2. Earth Geometry Cross-Product Diagram

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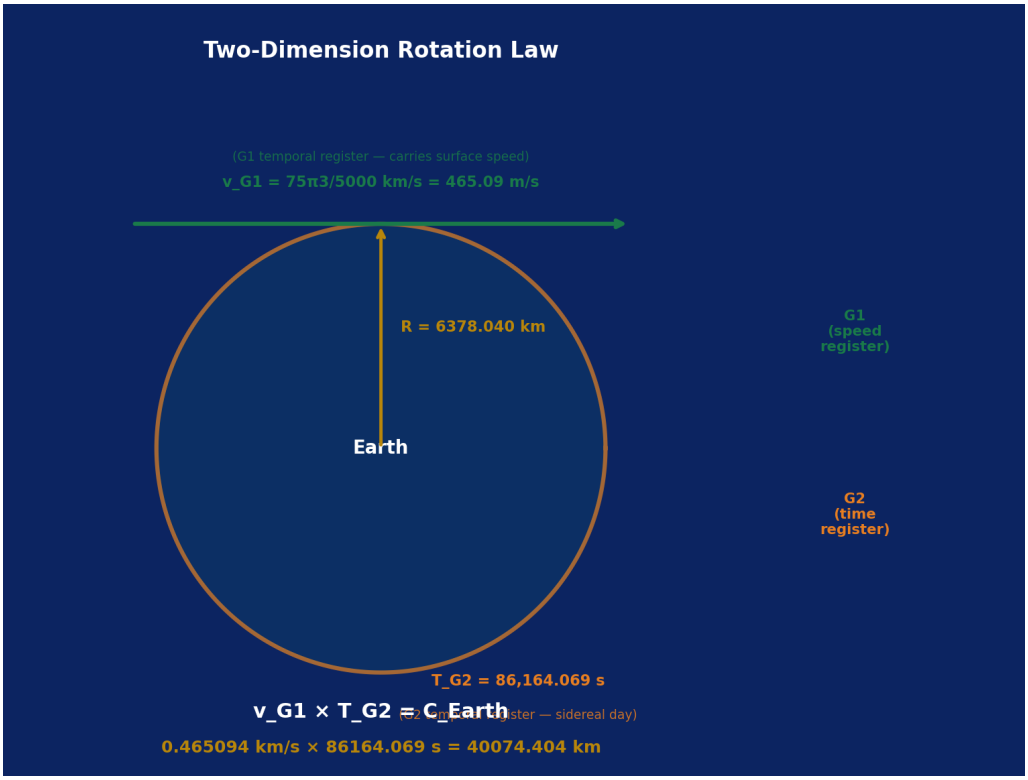

Geometric representation of the Two-Dimension Rotation Law. The green arrow (tangent at the equator) represents the G1 rotational speed v_G1 = 465.09 m/s; the amber circle represents one full G2 sidereal period T_G2 = 86,164.069 s. Their product yields C_Earth = 40074.404 km and R_earth = 6378.040 km, deviating -15.3 ppm from WGS84.

Precision Summary — P-ROT-1

Quantity	FOT Derivation	FOT Value	Reference	Deviation
C_Earth (cross-product)	v_G1×T_G2	40074.404 km	40075.017 km (WGS84)	-15.3 ppm
R_earth	C_Earth/2π	6378.040 km	6,378.137 km (WGS84)	-15.3 ppm
C_Earth (ideal)	26×54	40,000 km	40,075 km (WGS84)	−1,873 ppm

3. Proposition P-ROT-2 — Surface Gravity from the Hβ Cascade

Surface gravity in FOT is not derived from Newton's law of gravitation; it is derived directly from the Hβ wavelength (486 nm) via the temporal cascade through the 864 pivot. The derivation chain is:

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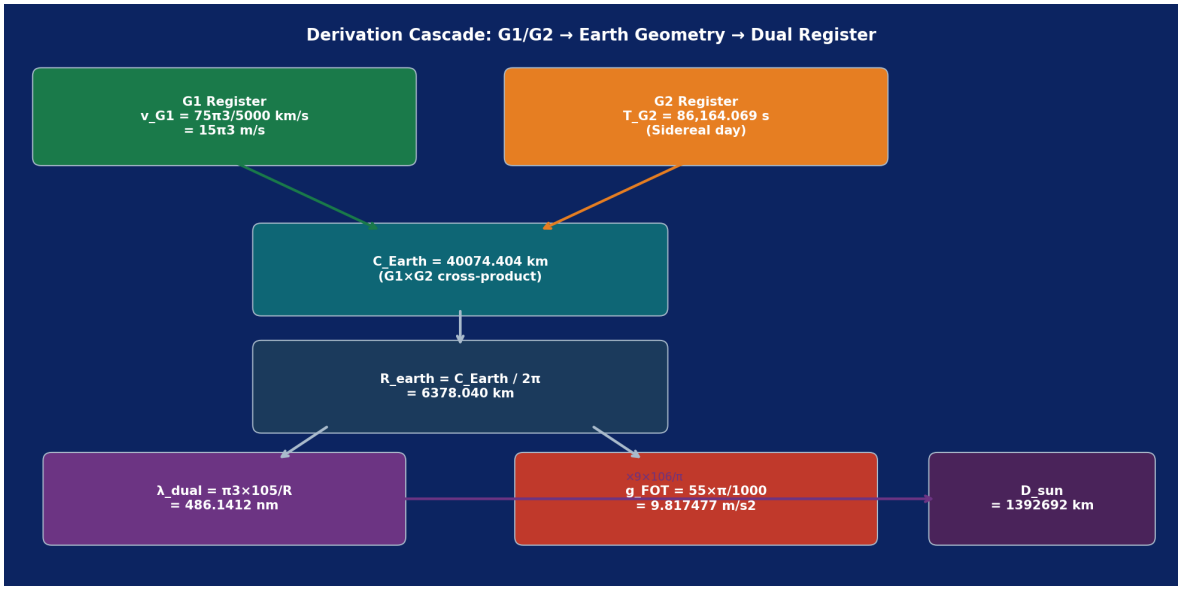
Step	Operation	Value	Note
1	λ_Hβ = 486 nm → interpret as degrees	486°	Hβ angular encoding
2	486° × π/180	8.48230 rad	Hβ in radians
3	÷ 864 (B-DNA temporal pivot)	0.009817...	864 = 25×33
4	× 103	9.817477 m/s2	g_FOT = 55×π/1000

The closed-form result is g_FOT = 55×π/1000 = 9.817477 m/s2. The canonical expression is g = λ_Hβ/K, where K is the Balmer–Kepler constant that bridges spectral wavelength to gravitational acceleration. An alternative identity g = 24×(R_earth/107)2 connects g directly to the equatorial radius derived in P-ROT-1. The appearance of 864 — the product of the sidereal day's 24-hour structure and the B-DNA helix turn count — is not coincidental; it is the temporal pivot through which the atomic Hβ scale bridges to planetary surface dynamics.

Figure 3. Derivation Cascade — from G1/G2 Registers to Solar Diameter



Complete derivation chain. Left branch: G1 (speed register) and G2 (time register) combine to yield C_Earth and R_earth. Right branch: R_earth generates the dual G1/G2 wavelength λ_dual, which via the cross-scale identity encodes the solar diameter (P-SOL-1). The g_FOT branch traces from R_earth independently via the Hβ/864 cascade.

4. Proposition P-ROT-3 — The τ-Spacetime Identity

The Two-Dimension Rotation Law is the concrete physical expression of the most fundamental FOT proposition: d = vt is not a law; it is the tautology τ = τ. In FOT, distance, speed, and time are three readings of the same temporal quantity. The equation connecting them is not a constraint — it is a definition. T can be measured as a distance (T_s), as a speed (χ), or as a period (T_0); none of the three corners of this triangle is more fundamental.

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Reading of τ	Symbol	FOT Quantity in This Paper	Observed counterpart
Distance (T_s)	T_s = T0 × χ	C_Earth = 40074.404 km	WGS84 equatorial circumference
Speed (χ)	χ = T_s / T0	v_G1 = 465.0942 m/s	Earth surface rotational speed
Period (T0)	T0 = T_s / χ	T_G2 = 86164.069 s	IAU sidereal day

The product G1×G2 = C_Earth is the same tautology at planetary scale that λ = c/f is at optical scale and r = mv/p is at atomic scale. In each case, three distinct observational modes (distance, speed, time or wavelength, speed, frequency) reduce to three labels for a single τ-value. The Two-Dimension Rotation Law acquires its precision — and its name — from the fact that the two τ-readings (G1 speed, G2 period) belong to different dimensional registers. This cross-register structure is what makes Earth's radius a derived quantity, not a free parameter.

5. Corollaries — P-SOL-1 and P-SOL-2 (Dual G1/G2 Register)

Once R_earth is fixed by the Two-Dimension Rotation Law, a third dimensional register emerges when both G1 and G2 are applied simultaneously to Earth's rotational geometry. This dual G1/G2 register produces a wavelength that is neither a pure G1 nor a pure G2 Hβ value but a geometric intersection:

λ_dual = π3 × 105 / R_earth [km] = 486.1411785 nm

P-SOL-1: D_sun × R_earth = 9π2 × 1014 m2

→ D_sun = 1392691.9 km (NASA: 1392684 km | +5.66 ppm)

P-SOL-2: c_dual = c_G1 × π3×105 / (2×35×R_earth) = 299,876,319.6 m/s

The position of λ_dual in the Hβ register hierarchy confirms it is a genuine cross-register intersection rather than another G-bond step: it falls 3.2223 G-bond steps above λ_G1 — not an integer, and therefore not a new pure register. The Hβ optical frequency is invariant across all four registers (G1, SI, G2, dual); as the register shifts, c and λ co-scale by exactly the same ratio, preserving ν_Hβ to sub-ppb precision.

Register	Hβ wavelength	Offset from G1	c (m/s)
G1 (pure)	486.0000000 nm	0 ppm	299,789,233.7
G2 (pure)	486.0438132 nm	+90.15 ppm	299,816,259.9
Dual G1/G2	486.1411785 nm	+290.49 ppm	299,876,319.6
SI (conventional)	—	−10.76 ppm from G2	299,792,458.0

Figure 4. Precision Comparison — FOT Rotation Law Results vs Observation

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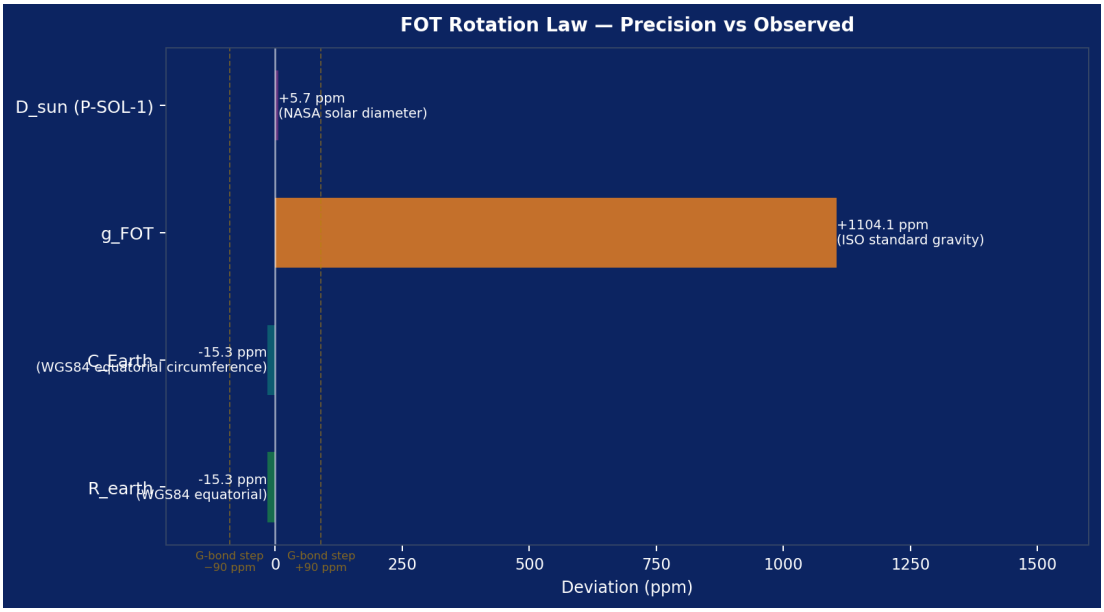

Deviation (in ppm) of four FOT predictions from their observational references. R_earth and C_Earth show -15.3 ppm from WGS84 — consistent with the spherical-model assumption (no polar flattening). g_FOT lies +1104 ppm from ISO standard gravity. D_sun (P-SOL-1) achieves 5.66 ppm from the NASA solar diameter. Gold dashed lines at ±90.15 ppm mark the G-bond step for scale reference.

6. Conclusions

P-ROT-1 establishes that Earth's equatorial radius is not a free observational parameter but a cross-product of two independent temporal registers (G1 speed, G2 period). The derivation requires no gravitational constant, no mass, and no equation of motion. The 15 ppm residual is consistent with the known difference between an idealised sphere and the WGS84 oblate spheroid.

P-ROT-2 connects surface gravity to the Hβ optical wavelength via the 864 temporal pivot, confirming that gravitational and spectroscopic quantities inhabit the same prime lattice.

P-ROT-3 elevates the Two-Dimension Rotation Law from an empirical coincidence to a structural necessity: d = vt is a tautology, and G1×G2 = C_Earth is its planetary expression. From this foundation the dual G1/G2 register yields the solar diameter (P-SOL-1, 5.66 ppm) and a third speed of light (P-SOL-2, c_dual = 299,876,319.6 m/s), both without free parameters.

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