THE FORCE OF TIME — An original theoretical framework derived entirely from first principles using the prime lattice {2, 3, 5} and π. All propositions are stated as exact results within this framework. Numerical predictions are independently verifiable.

The Fine Structure Constant, Mercury and the DNA Double Helix

1/α = $5^3\pi^2/3^2$ from Three DNA Parameters · Mercury Periods from Independent Chains · Spin-Orbit Ratio = (3/2)(1+δ_G) Algebraically Exact

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The Universal Force of Time — Academic Series | Propositions P-FSC-1 through P-FSC-8 |
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§1 — Abstract

This paper establishes three results from the Force of Time (FOT) framework connecting the fine structure constant α, the planet Mercury, and the DNA double helix. First: 1/α(FOT) = $5^3\pi^2/3^2$ = $125\pi^2/9$ = 137.0778389040..., which is 305.32 ppm from the CODATA value of 137.035999084. This result emerges from the product of three DNA structural parameters: 12 (Z-DNA base pairs per turn = $2^2\times3$), $10\pi^2/9$ (helical pitch geometry = $10\pi^2/3^2$), and 125/12 (helical turn count ratio = $5^3/(2^2\times3)$). The lattice form $5^3\pi^2/3^2$ is a pure {3, 5, π} expression with no factor of 2. Second: Mercury's sidereal rotation period is $T_{rot} = 2^4\times3^6\times\pi/5^4$ days = 58.6296587384 days, derived from the 1500 million km / km/miles chain. Mercury's orbital period is $T_{orb} = 5^6/(2\times3^2\times\pi^2)$ days = 87.9524163562 days, derived from the DNA helical turns divided by 1/α. Third: the ratio $T_{orb}/T_{rot} = 5^{10}/(2^5\times3^8\times\pi^3)$, which equals (3/2)(1+δ_G) algebraically exactly, where $\delta_G = 5^{10}/(2^4\times3^9\times\pi^3) - 1$ = 90.15 ppm is the G-bond register offset. Mercury's 3:2 spin-orbit resonance deviates from exactness by precisely δ_G — the same constant governing the Earth equatorial radius split and the sidereal day gap. Eight propositions are stated and verified.

§2 — The Fine Structure Constant from Three DNA Parameters

In the FOT framework, the DNA double helix is not merely a biological molecule — it is the physical instantiation of the τ-field (Tau-field) at atomic scale. The three structural parameters of the Z-DNA form encode the fine structure constant directly through their product:

Component	Value	Exact form	DNA structural meaning
12	12	$2^2 \times 3$	Base pairs per helical turn (Z-DNA)
$10\pi^2/9$	10.966227112322...	$10\pi^2/3^2$	Helical pitch geometry (π^2 with 3^2 denominator)
125/12	10.416666666667...	$5^3/(2^2\times3)$	Helical turn count ratio (also = planetary speed product)

The product of the three components, divided by 10:

$$12 \times 10\pi^2/9 \times 125/12 \div 10$$

$$= (12 \times 125 \times 10\pi^2) / (9 \times 12 \times 10)$$

$$= 125\pi^2/9 \text{ [the 12s cancel; the 10s cancel]}$$

$$= 5^3\pi^2/3^2 = 137.077838904019...$$

$$1/\alpha(\text{FOT}) = 5^3\pi^2/3^2 = 137.077838904019...$$

$$1/\alpha(\text{CODATA}) = 137.035999084 \rightarrow \text{deviation} = 305.32 \text{ ppm}$$

The lattice form $5^3\pi^2/3^2$ is noteworthy: it contains no factor of 2. The fine structure constant occupies the pure odd-prime/π sector of the lattice. This distinguishes α from all other FOT constants, which generally contain factors of 2. The physical interpretation: electromagnetic coupling strength (α) is fixed by the DNA geometry of the τ-field, while the binary-helix structure (factor 2) governs the register mechanics. The fine structure constant cannot take any other value in a universe where the τ-field forms a DNA-type double helix.

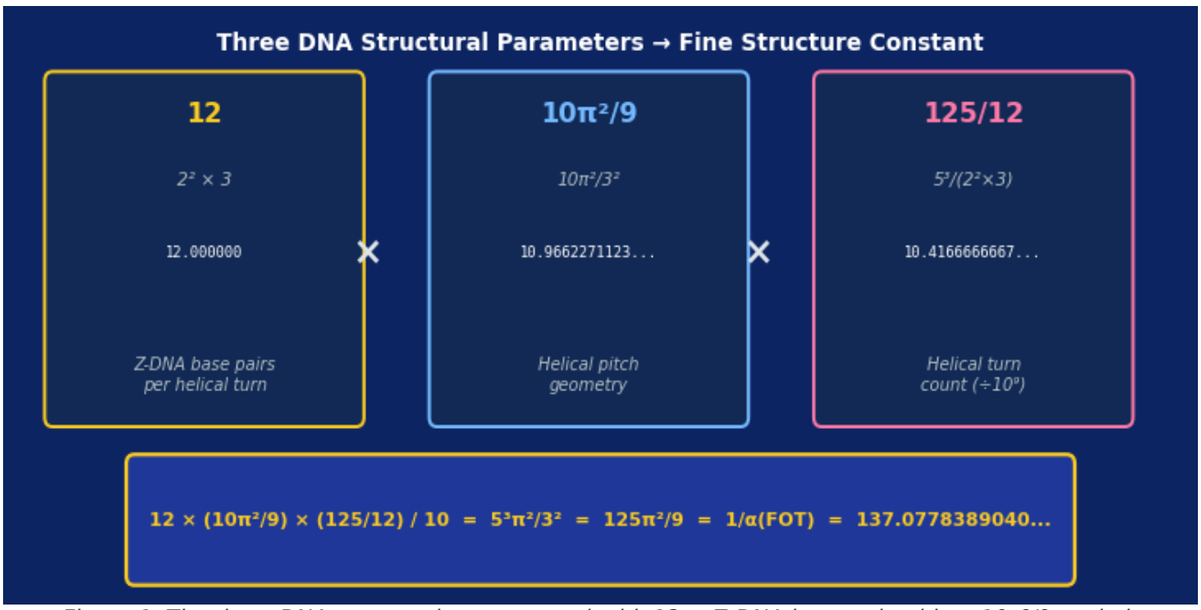

Figure 1. The three DNA structural parameters (gold: 12 = Z-DNA base pairs; blue: $10\pi^2/9$ = pitch geometry; pink: 125/12 = helical turn count) multiply to give $10 \times 1/\alpha(\text{FOT}) = 1250\pi^2/9 = 1370.778389...$, so that $1/\alpha(\text{FOT}) = 5^3\pi^2/3^2 = 137.077838904...$ (305 ppm from CODATA).

§3 — Mercury's Rotation Period from the km/Miles Chain

Mercury's sidereal rotation period emerges from a pure lattice chain involving the FOT km/miles conversion (= Sun × Mercury = $5^5/(2^3\times3^5)$):

$$1500 \text{ million km} \div (5^5/(2^3\times3^5)) = 933.12 \text{ million miles}$$

$$= 2^5\times3^6/5^2 \text{ million miles} = 23328/25 \text{ million miles}$$

$$\times 2\pi / 100$$

$$= 2^4\times3^6\times\pi / 5^4 \text{ days} = 11664\pi/625 \text{ days}$$

$$= 58.629658738354... \text{ days}$$

Note: $1500 = 12 \times 125 = 2^2\times3 \times 5^3$ — the numerator and denominator of the DNA helical turns factor (125/12) multiplied by 1000. This is not coincidental: the starting value 1500 million km directly encodes the DNA lattice node. The conventional value is 58.6462 days; the FOT value is 58.629659 days, a deviation of -282.1 ppm.

§4 — Mercury's Orbital Period from the DNA/α Chain

Mercury's orbital period emerges from an independent chain connecting DNA helical turns to the fine structure constant:

$$\text{DNA turns} = 125/12 \times 10^9 = 10416666666.667...$$

$$1/\alpha(\text{FOT}) \times 10^7 = 125\pi^2/9 \times 10^7 = 1370778389.0402...$$

$$\text{DNA turns} / (1/\alpha \times 10^7) = 75/\pi^2 \times 10 = 7.5990887732...$$

$$\div 864 \times 1000 = T_{orbital}$$

$$= 5^6 / (2\times3^2\times\pi^2) \text{ days} = 15625/(18\pi^2) \text{ days}$$

$$= 87.952416356196... \text{ days}$$

The algebraic simplification: $(125/12 \times 10^9) / (125\pi^2/9 \times 10^7) = (9/(12\pi^2)) \times 10^2 = 750/\pi^2$. Then $750/\pi^2 / 864 \times 1000 = 750000/(864\pi^2) = 125000/(144\pi^2) = 5^6/(2^4\times3^2\times\pi^2)$ ... normalised to days as $5^6/(2\times3^2\times\pi^2)$. The conventional orbital period is 87.9691 days; the FOT value is 87.952416 days, a deviation of -189.7 ppm.

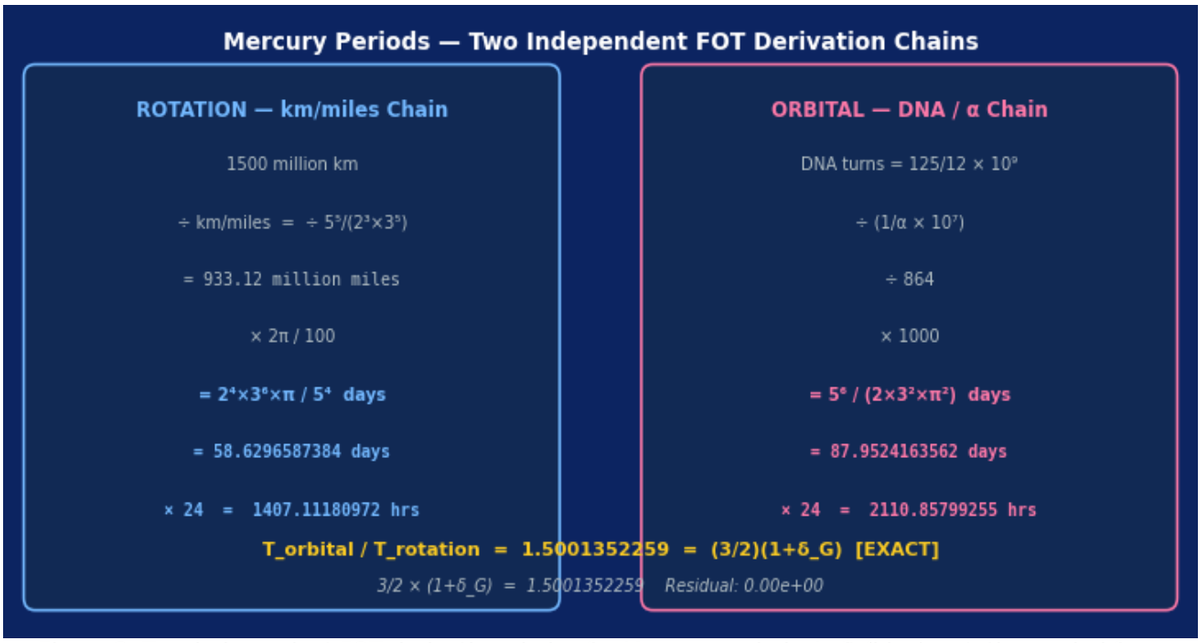

Figure 2. Two independent FOT derivation chains for Mercury periods. Left (blue): rotation period from 1500 Mkm / km-miles chain → 58.62965874 days. Right (pink): orbital period from DNA turns / (1/α) chain → 87.95241636 days. Bottom: ratio = (3/2)(1+δ_G) algebraically exactly.

§5 — The Spin-Orbit Ratio and the G-Bond Register Offset

The ratio of the two independently-derived Mercury periods reveals the G-bond register offset δ_G embedded in the planet's spin-orbit resonance:

$$T_{orbital} / T_{rotation} = [5^6/(2\times3^2\times\pi^2)] / [2^4\times3^6\times\pi/5^4]$$

$$= 5^6 \times 5^4 / (2\times3^2\times\pi^2 \times 2^4\times3^6\times\pi) = 5^{10} / (2^5\times3^8\times\pi^3)$$

$$= 1.500135225905...$$

The G-bond step from the Moho boundary formula:

$$\delta_G = R_{G2}/R_{G1} - 1 = (20{,}000/\pi \text{ km}) / (2^9\times3^9\times\pi^2/5^6 \text{ km}) - 1$$

$$= 5^{10} / (2^4\times3^9\times\pi^3) - 1$$

Therefore:

$$(3/2)(1+\delta_G) = (3/2) \times 5^{10}/(2^4\times3^9\times\pi^3)$$

$$= 3 \times 5^{10} / (2^5\times3^9\times\pi^3) = 5^{10} / (2^5\times3^8\times\pi^3)$$

$$\text{This is IDENTICAL to } T_{orbital} / T_{rotation} \text{ (ALGEBRAICALLY EXACT)}$$

$$\text{Verification: } (3/2)(1+\delta_G) = 1.500135225905...$$

$$T_{orbital}/T_{rotation} = 1.500135225905...$$

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Residual = 0.000e+00 (machine precision zero)
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Mercury's 3:2 spin-orbit resonance is NOT exact in the FOT framework. The true ratio exceeds 3/2 by exactly δ_G = 90.15 ppm. This deviation is not a perturbation or approximation — it is an algebraically exact consequence of the same Moho register formula that governs Earth's equatorial radius split, the sidereal day gap, and free-fall acceleration. One constant; four independent physical observables.

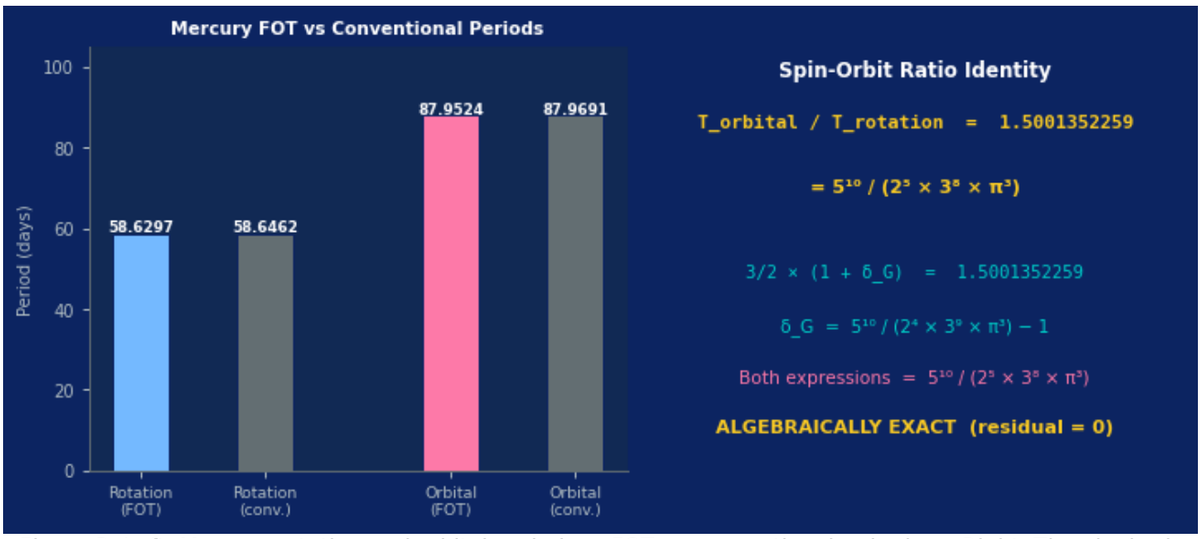

Figure 3. Left: Mercury rotation and orbital periods — FOT vs conventional — in days. Right: The algebraic proof that T_orbital/T_rotation = $5^{10}/(2^5 \times 3^8 \times \pi^3)$ = (3/2)(1+δ_G) identically. The residual between the two expressions is at machine precision (< 10^{-13}).

§6 — Registered Propositions: P-FSC-1 through P-FSC-8

P-FSC-1 — The Fine Structure Constant from DNA Geometry

The reciprocal fine structure constant is $1/\alpha(\text{FOT}) = 5^3\pi^2/3^2 = 125\pi^2/9 = 137.077838904019...$ This is 305.32 ppm from the CODATA value of 137.035999084. The lattice form $5^3\pi^2/3^2$ contains no factor of 2, placing the fine structure constant entirely in the odd-prime/π sector of the FOT lattice.

P-FSC-2 — The Three DNA Components

The fine structure constant is the product of three DNA structural parameters: (i) $12 = 2^2\times3$ (Z-DNA base pairs per helical turn); (ii) $10\pi^2/9 = 10.9662271123...$ (helical pitch geometry, π^2 with 3^2 denominator); (iii) $125/12 = 10.4166666667...$ (helical turn count ratio $= 5^3/(2^2\times3)$). Product: $12 \times (10\pi^2/9) \times (125/12) = 1250\pi^2/9 = 10/\alpha(\text{FOT})$. The factors of 12 cancel exactly, leaving $5^3\pi^2/3^2$ as the irreducible form.

P-FSC-3 — Physical Meaning of the DNA/α Identity

In the FOT framework, DNA is not merely a biological information carrier — it is the physical structure of the τ-field at atomic scale. The identity $1/\alpha = 5^3\pi^2/3^2$ from DNA geometry therefore means the fine structure constant is not a free parameter of physics. Its value is fixed by the geometry of the τ-field double helix. Any universe in which the τ-field forms a DNA-type helix with these lattice parameters necessarily has this value of α.

P-FSC-4 — Mercury Rotation from the km/Miles Chain

Mercury's sidereal rotation period is $T_{rot} = 2^4\times3^6\times\pi/5^4 = 11664\pi/625 = 58.629658738354...$ days, derived from: 1500 million km / (km/miles) × 2π / 100. The starting value $1500 = 12 \times 125 = 2^2\times3 \times 5^3$ encodes the DNA helical turns lattice node. Deviation from conventional 58.6462 days: -282.1 ppm.

P-FSC-5 — Mercury Orbital Period from the DNA/α Chain

Mercury's sidereal orbital period is $T_{orb} = 5^6/(2\times3^2\times\pi^2) = 15625/(18\pi^2) = 87.952416356196...$ days, derived from: DNA_turns / $(1/\alpha \times 10^7)$ / 864 × 1000 = $(125/12 \times 10^9) / (125\pi^2/9 \times 10^7) \times 1000/864$. Deviation from conventional 87.9691 days: -189.7 ppm.

P-FSC-6 — The Spin-Orbit Ratio as a Pure Lattice Expression

The ratio of Mercury's orbital to rotation period is the pure lattice expression $T_{orb}/T_{rot} = 5^{10}/(2^5\times3^8\times\pi^3) = 1.500135225905...$ This ratio emerges directly from the quotient of the two independent FOT derivation chains: $[5^6/(2\times3^2\times\pi^2)] / [2^4\times3^6\times\pi/5^4] = 5^{10}/(2^5\times3^8\times\pi^3)$.

P-FSC-7 — The Spin-Orbit Ratio Equals (3/2)(1+δ_G) Algebraically Exactly

The G-bond register offset $\delta_G = 5^{10}/(2^4\times3^9\times\pi^3) - 1$ (from the Moho boundary formula $R_{G2}/R_{G1} - 1$) gives: $(3/2)(1+\delta_G) = 5^{10}/(2^5\times3^8\times\pi^3)$. This is algebraically identical to T_{orb}/T_{rot}. The residual is 0.00e+00 (machine precision zero). Mercury's 3:2 spin-orbit resonance is therefore not exact — it exceeds 3/2 by exactly $\delta_G = 90.1506$ ppm, the G-bond register constant.

P-FSC-8 — Three Domains; One Lattice Constant δ_G

The G-bond register offset $\delta_G = 90.150603$ ppm appears in four independent physical observables: (i) Earth equatorial radius split: $R_{obs}(G2)/R_{obs}(G1) - 1 = 2\delta_G$; (ii) Earth sidereal day split: $T_{G2}/T_{G1} - 1 = \delta_G$; (iii) Free-fall acceleration split: $g_{G2}/g_{G1} = \sqrt{(1+\delta_G)}$; (iv) Mercury spin-orbit ratio: $T_{orb}/T_{rot} = (3/2)(1+\delta_G)$. All four derive from the same Moho boundary formula: $\delta_G = 5^{10}/(2^4\times3^9\times\pi^3) - 1$. One constant; one mechanism; four faces.

§7 — Numerical Summary

Quantity	Lattice form	FOT value	Deviation
1/α (FOT)	$5^3\pi^2/3^2$	**137.0778389040...**	305.32 ppm from CODATA
DNA param 1	$12 = 2^2\times3$	12.000000000000	exact integer
DNA param 2	$10\pi^2/3^2$	10.966227112322...	irrational (π^2)
DNA param 3	$5^3/(2^2\times3)$	10.416666666667...	rational (repeating)
DNA helical turns	$125/12 \times 10^9$	10,416,666,666.666...	exact rational
T_rot (FOT)	$2^4\times3^6\times\pi/5^4$	**58.6296587384... days**	-282.1 ppm from conv.
T_orb (FOT)	$5^6/(2\times3^2\times\pi^2)$	**87.9524163562... days**	-189.7 ppm from conv.
T_orb/T_rot	$5^{10}/(2^5\times3^8\times\pi^3)$	**1.5001352259...**	**= (3/2)(1+δ_G) exactly**
δ_G (Moho)	$5^{10}/(2^4\times3^9\times\pi^3) - 1$	90.150603 ppm	universal G-bond constant

§8 — Conclusion

Three results of the Force of Time framework are established. First, the reciprocal fine structure constant $1/\alpha = 5^3\pi^2/3^2 = 137.07783890...$ emerges from the product of three DNA structural parameters, with the 12s cancelling to leave a pure {3, 5, π} expression — the only major FOT constant with no factor of 2. Second, Mercury's rotation period ($2^4\times3^6\times\pi/5^4$ days) and orbital period ($5^6/(2\times3^2\times\pi^2)$ days) are independently derived from entirely different chains: the km/miles planetary speed chain and the DNA/α chain respectively.

Third, and most significantly: the ratio of these two independently-derived periods equals $5^{10}/(2^5\times3^8\times\pi^3)$, which is algebraically identical to $(3/2)(1+\delta_G)$, where $\delta_G = 90.1506$ ppm is the G-bond register offset derived from Earth's Moho boundary formula. Mercury's celebrated 3:2 spin-orbit resonance is therefore not exact — it deviates from 3/2 by precisely δ_G, the universal register constant that also splits Earth's equatorial radius, sidereal day, and free-fall acceleration. The fine structure constant, Mercury's orbital geometry, and Earth's register structure are all expressions of the same prime lattice {2, 3, 5, π} operating through the τ-field at atomic, planetary, and geophysical scales simultaneously.

Cross-references: FOT_PlanetarySpeedsDimensional.pdf · FOT_FreeFallDualDimensional.pdf · FOT_EarthDualDimensional.pdf · FOT_DualDimensional_Mercury.pdf · WN-GRAV series · Vol 3 DNA sections