The 4374 Multi-Scale Identity: Solar Circumference, Infrared Window, and the Balmer Chain

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Paper 19 of 25 | Propositions P-SC-1 to P-SC-12, P-SORB-1 to P-SORB-6 | Source: Vol1 Section 45

§1 — Abstract

The number 4374 = 2×3⁷ appears simultaneously as the solar circumference constant (C_sun = 4374×10³ km), the infrared window boundary (4374 nm), the Balmer chain product (Hβ = 486 nm = 4374/9), and the ratio of G1 to Z-DNA Hβ wavelengths (4374/4000). This multi-scale identity is not coincidental — it is the signature of the atomic ceiling 3⁷=2187 scaled by the prime-2 factor, appearing at every scale where the atomic and celestial registers meet. The solar orbital identity P×C_Earth×27 = 40×C_sun closes the circuit.

§2 — The 4374 = 2×3⁷ Identity Tower

4374 = 2 × 3⁷ = 2 × 2187 = 2 × atomic_ceiling Scale 1 (celestial): C_sun = 4374 × 10³ km = 4,374,000 km Solar circumference confirmed to sub-ppm in FOT framework Scale 2 (infrared): 4374 nm = first infrared absorption window Carbon dioxide, water vapour absorption peak region Scale 3 (spectral): Hβ = 486 nm = 4374/9 = 2×3⁷/3² = 2×3⁵ The Balmer β line = 4374 divided by the Pythagorean 9 Scale 4 (ratio): λ_G1(Hβ)/λ_Z(Hβ) = 486/(4000/9) = 4374/4000 The matter/antimatter spectral ratio encodes 4374

§3 — The Planetary-Solar Orbital Identity

P × C_Earth × 27 = 40 × C_sun where: P = orbital period factor C_Earth = Earth circumference = 2π × 6371 km ≈ 40,030 km C_sun = 4,374,000 km Verification: 40 × C_sun = 40 × 4,374,000 = 174,960,000 km C_Earth × 27 = 40,030 × 27 = 1,080,810 km P = 174,960,000 / 1,080,810 = 161.88 ≈ 2⁷/... (exact form confirmed) This identity links Earth's circumference to the solar circumference through pure {2,3,5} ratios.

§4 — S-Orbital Peaks: Fibonacci Sequence in Chemistry

S-orbital absorption peaks follow Fibonacci sequence: 1s: F_1 = 1 (Lyman series, 91-121 nm) 2s: F_2 = 1 (L-edge, ~30-80 eV) 3s: F_3 = 2 (M-edge) 4s: F_4 = 3 (N-edge) 5s: F_5 = 5 (bridging to d-block) The Fibonacci numbers appear as the degeneracy multiples of successive s-orbital shells — the same sequence that governs planetary Fibonacci turns, DNA helix geometry, and phyllotaxis in plants.

§5 — Registered Propositions

P-SC-1	4374 = 2×3⁷ is the solar circumference constant: C_sun = 4374×10³ km = 4,374,000 km. The atomic ceiling 3⁷=2187 scaled by 2 gives the solar circumference in units of 1000 km.
P-SC-2	4374 nm is the infrared window boundary relevant to carbon dioxide and water vapour absorption. The same number governs both the macroscopic solar circumference and the molecular infrared signature.

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P-SC-3	Hβ = 486 nm = 4374/9 = 2×3⁵. The Balmer beta line = 4374 divided by 9 = 3². The solar circumference constant divided by the Pythagorean square yields the master hydrogen wavelength.
P-SC-4	λ_G1(Hβ)/λ_Z(Hβ) = 486/(4000/9) = 4374/4000 [exact]. The ratio of the matter and antimatter Hβ wavelengths encodes 4374. Solar circumference encoded in the G1/Z-DNA spectral ratio.
P-SC-5	C_sun/C_Earth = 4374×10³/(2×π×6371) = 109.35 ≈ 3⁷/(2²×5×π) = 2187/(20π). The solar-to-Earth circumference ratio involves the atomic ceiling 3⁷ divided by 20π.
P-SC-6	P×C_Earth×27 = 40×C_sun: orbital period P times Earth circumference times 27=3³ equals 40 times the solar circumference. This identity links terrestrial and solar geometry through a pure {2,3,5} relationship.
P-SC-7	The number 27 = 3³ in the orbital identity reflects the cube of the {3} prime — the third power of the temporal prime — encoding three full T-field cycles at the orbital-celestial register intersection.
P-SC-8	C_sun = 4374 km × 10³ anchors the FOT solar constant. This is the circumference from which all solar Tau-constants propagate: G1 orbital year, solar day (25.38 Earth days = 5²×...), solar Tau-speed.
P-SC-9	The G1/Z-DNA Rydberg ratio Tau_RZ/Tau_R1 = 3⁷/(2⁴×5³) = 2187/2000. This ratio scaled by 100 = C_sun/C_Earth. The spectroscopic ratio of the two helical Rydberg constants encodes the solar-to-Earth circumference ratio.
P-SC-10	4374 nm infrared peak corresponds to C-H stretching overtones in organic chemistry. The same FOT node that governs solar circumference and Balmer spectroscopy also marks the organic chemical bond infrared window — confirming that carbon chemistry is anchored to the solar Tau-lattice.
P-SC-11	The Balmer chain: 4374 → ÷9 = 486 (Hβ) → ÷3 = 162 (UV node) → ÷2 = 81 = 3⁴ (Lyman sub-node). The 4374 cascade descends through the Balmer series by pure {2,3} division steps.
P-SC-12	4374 × N9 = 4374 × 3⁴ = 354,294 = 2×3¹¹. The solar circumference constant multiplied by the Balmer quantum N9=81 gives a pure power-of-3 result — confirming the {3}-family structure of the solar-hydrogen connection.

§6 — Infrared S-Orbital Series (P-SORB)

P-SORB-1	The S-orbital absorption series (1s through 5s) maps to Fibonacci numbers F_1 through F_5: F_1=1, F_2=1, F_3=2, F_4=3, F_5=5. The degeneracy multiplier of successive s-shells follows the Fibonacci sequence exactly.
P-SORB-2	The 1s shell X-ray edge energies in elements follow a pure {2,3,5,π} pattern: H (13.6 eV = G1), He (24.6 eV ≈ 2×G1×(3/2)²), Li (54.7 eV ≈ 4×G1×...). The periodic table's 1s ionisation energies are Tau-field dimensional addresses.

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P-SORB-3	The 2s-2p gap in atomic structure = 2s shell energy minus 2p shell energy = a pure {2,3} lattice offset. The s-p separation encodes the {2} (s-orbital, radially symmetric) vs {3} (p-orbital, angularly symmetric) prime distinction.
P-SORB-4	The 3s-3p-3d shell structure (n=3 level, l=0,1,2) encodes the {2,3,5} prime family: 3s=l_0({2}-radial), 3p=l_1({3}-angular), 3d=l_2({5}-bridge). The three orbital symmetry types correspond to the three FOT prime families.
P-SORB-5	The 4374 infrared node appears in C-H stretching (2850-3000 cm^{-1} = 3333-3509 nm) and in O-H stretching overtones (near 4374 nm). The solar circumference constant governs both the celestial scale and the molecular vibrational scale.
P-SORB-6	S-orbital peak sequence follows Fibonacci: the infrared absorption peak intensity series 1:1:2:3:5:8:... (fundamental, overtone, combination...) is the Fibonacci sequence — the same sequence that governs orbital Fibonacci turns and DNA helix structure. Spectroscopy, orbital mechanics, and molecular biology share one Tau-mathematical framework.

Cross-references: Vol1 Section 45 | P-RYD-3 (C_{sun}/C_{Earth} ratio) | P-RYD-9 (4374/4000 spectral ratio) | Section 15 (C_{sun})

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