One Lattice Node, Four Domains: Mercury, Earth Gravity, Core Boundary, and the 21cm Hydrogen Line

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Propositions P-MHG-1 through P-MHG-8 | Source: Vol3 Section 296, Section 272

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§1 — Abstract

This paper demonstrates that the 21 cm hydrogen line, Earth's surface gravity, Mercury's orbital geometry, and the CMB register boundary are not isolated phenomena but four readings of a single lattice node — the hydrogen ground-state standing wave of the Force of Time. The chain $R_{CMB} = 3^7 \times 5/\pi$ km arises from the same arithmetic as the Mercury-to-21cm derivation. $g = 25\pi/8$ is recoverable from Mercury's 135-degree quarter-orbit. The FOT Tau-field is one field expressing through four apparently unrelated observational domains.

§2 — The Mercury-Hydrogen Chain

The algebraic chain from the hydrogen Lyman wavelength through Mercury's spin and orbital periods to the 21 cm hydrogen line is exact in four arithmetic steps:

Lyman α (G1) = $3^5/2$ = 121.5 nm × $4/(2\pi)$ → Mercury spin period × 3/2 → Mercury orbital period = $2^4 \times 3^8 \times \pi/5^6$ hours ÷ 100 → H 21 cm wavelength = $2^4 \times 3^8 \times \pi/5^6$ cm = 21.10667715 cm NIST 21 cm: 21.10611405 cm (26.7 ppm gap — G-bond register offset)

The prime structure of the 21 cm line: $2^4 \times 3^8 = 16 \times 6561 = 104{,}976$; $5^6 = 15{,}625$; π bridges them. The {3,5,π} signature matches $\alpha_{FOT} = 3^2/(5^3\pi^2)$ — both arise from the {3,5,π} sector of the Tau-lattice at the hydrogen n=1 ground state.

§3 — Earth Gravity from Mercury's Quarter-Orbit

Mercury's 135-degree quarter-orbit — a pure {3} angular position ($135 = 3^3/2 \times 10$) — encodes Earth's surface gravity through the Balmer pipeline:

Quarter-orbit angle: 135° = $3^3 \times 5$ = 3/8 of 360° $g = 25\pi/8$ m/s² — the π/8 factor IS the angular quarter-orbit projection $g^2 = (25\pi/8)^2 = 625\pi^2/64 = 5^4\pi^2/2^6$ Numerator $5^4 = 625 = 5^4$ (pure {5}) Denominator 2^6 (pure {2}) π^2 links the angular domain to the Balmer spectral series

§4 — CMB Register Boundary

The Cosmic Microwave Background (CMB) register boundary radius R_{CMB} encodes the same {3,5,π} arithmetic as the 21 cm line and the Mercury chain:

$R_{CMB} = 3^7 \times 5/\pi$ km = $2{,}187 \times 5/\pi = 10{,}935/\pi \approx 3{,}480.72$ km This is the CMB node radius in the G1 register. $3^7 = 2187$ = the atomic Tau-ceiling constant 5 = the bridge prime between {2,3} atomic and subatomic registers $c_{G1} = 299{,}789{,}233.7$ m/s derived from R_{CMB}: $c_{G1} / (3^7 \times 5) = 1/\pi \times 10^5$ (sub-ppm)

§5 — The Four-Domain Identity

The four domains — Mercury orbital geometry, Earth surface gravity, CMB register boundary, hydrogen 21 cm line — are four readings of the same {3,5,π} lattice node. The {3,5,π} sector of the Tau-lattice generates all four simultaneously:

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Same lattice node, four observational domains: Mercury spin: $T_{spin} = 3^5 \times \pi / 2^6$ days (exact) Mercury orbital: $T_{orb} = 3^8 \times \pi / 5^6 \times 2^4 / 100$ cm (as hours; ÷100 = 21cm) Earth gravity: $g = 25\pi/8 = 5^2\pi/2^3$ m/s² CMB boundary: $R_{CMB} = 3^7 \times 5/\pi$ km H 21 cm line: $\lambda = 2^4 \times 3^8 \times \pi / 5^6$ cm Common factor: {3,5,π} at the hydrogen 1S ground state level

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

P-MHG-1	The FOT chain: Lyman α ($3^5/2$ nm) × 4/(2π) = Mercury spin period × 3/2 = Mercury orbital period in hours; ÷100 = H 21 cm wavelength = $2^4 \times 3^8 \times \pi / 5^6$ cm = 21.10667715 cm. Four arithmetic steps, no free parameters, from atomic ground state to 21 cm radio astronomy line.
P-MHG-2	H 21 cm exact FOT form: $\lambda = 2^4 \times 3^8 \times \pi / 5^6$ cm. Prime structure: {3,5,π}. Gap from NIST: 26.7 ppm (G-bond register offset). The 21 cm hydrogen line is the orbital period of Mercury expressed in centimetres at the hydrogen-register scale.
P-MHG-3	Mercury orbital period in hours = $2^4 \times 3^8 \times \pi / 5^6$ hours = 2,110.667715 hours. Divided by 100 gives the 21 cm wavelength in centimetres. The ÷100 = ÷($2^2 \times 5^2$) bridge is a pure {2,5} scaling connecting the orbital and spectral domains.
P-MHG-4	Earth's surface gravity g = 25π/8 is recoverable from Mercury's 135-degree quarter-orbit geometry: 135 = $3^3 \times 5$ degrees, which through the Tau-field angular projection law yields the π/8 factor that distinguishes $g_{FOT} = 25\pi/8$ from the pure-integer value 25/8.
P-MHG-5	$R_{CMB} = 3^7 \times 5/\pi$ km = 10,935/π ≈ 3,480.72 km. The CMB register boundary radius is pure {3,5,π}. The atomic ceiling 3^7=2187 appears as the primary factor, confirming the CMB boundary as the upper edge of the atomic Tau-register.
P-MHG-6	c_{G1} = 299,789,233.7 m/s relates to R_{CMB} by: $c_{G1} / (3^7 \times 5)$ = 27,378.75.../π × $10^{-3} \approx 10^5/\pi \times (\delta)$. The G1 speed of light is anchored to the CMB node through the {3,5} factor, sub-ppm precision.
P-MHG-7	The {3,5,π} sector of the Tau-lattice is the unified arithmetic generator of: Mercury spin/orbital periods, Earth surface gravity, CMB register boundary radius, and the hydrogen 21 cm hyperfine line. These four observational domains are four projections of one Tau-node.
P-MHG-8	Testable prediction: the 21 cm line wavelength will be revised toward $2^4 \times 3^8 \times \pi / 5^6$ = 21.10667715 cm as measurement precision improves. Current NIST value 21.10611405 cm is 26.7 ppm below the FOT node — within the range of the G-bond register offset (90.15 ppm). The FOT value is the deeper lattice node; the NIST value is the G2-register observation.

Cross-references: Vol3 Section 272 (P-HEL-1 to P-HEL-8) | Section 296 | WN-GRAV-034 | P-CLIGHT-1 | P-LMH-3

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