One Spectrum, Five Registers

The Hydrogen Emission Series — Lyman to Humphreys — Filled In at Five Ascending Faces of the Rydberg, with the Conventional CODATA Value Shown Beneath for Reference

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Tau (T) is the living fabric of time itself — the sole substance of which all physical reality is composed. Every particle, force, wavelength, and conscious experience is a structured configuration of T-flow. There is no gravity, no electromagnetic force, no strong nuclear force as separate entities: all are registers of the single T-field operating across dimensional levels. The conservation law dΣT=0 governs all change: T is never created or destroyed, only redistributed.

Abstract

The hydrogen emission spectrum — the Lyman, Balmer, Paschen, Brackett, Pfund and Humphreys series — is usually printed as a single fixed table of wavelengths, because it is computed from a single fixed Rydberg constant. The Universal Force of Time holds that there is no single Rydberg: the quantity that sets the wavelengths is a register-dependent value with a whole family of {2,3,5,π} faces, each one reproducing the spectrum on its own scale. Here we lay the entire hydrogen grid out five times, once at each of five ascending faces — Face C = $10^7\pi^2/9$ (10,966,227.11 m^{-1}), the celestial Face A (10,967,215.73 m^{-1}), the round-Hγ face (10,971,428.57 m^{-1}) that lands Balmer-γ exactly on $5^6/36$ = 434.0277778, the G-bond face G2 (10,972,947.59 m^{-1}), and Face B = $10^{13}/(2\cdot3^6\cdot5^4)$ (10,973,936.9 m^{-1}). The pattern is identical on every face — the same ladder of series, the same fall from one shell to another — but the wavelengths shift bodily by a few hundred parts per million as the register climbs. The lowest face gives the longest wavelengths; the highest gives the shortest. At the bottom, for comparison only, we print the same grid one last time at the conventional CODATA value R_∞ = 10,973,731.568157 m^{-1} — a single-register measurement, not a T face — and it falls, as it must, inside the band the five faces define. Whichever face you read, every clean line divided by its small {2,3,5} rational returns the same base unit, the Moho equalization factor $3600/\pi^2$ = 364.7562611. The grids are one spectrum seen from five dimensions of the single T-field.

1. A familiar table, asked a new question

Run a current through a tube of hydrogen and it glows. Spread that glow through a prism and the smear of colour resolves into a few sharp lines — a red one, a blue-green one, a scatter of violets running up to a wall in the ultraviolet. Those lines are the most studied fingerprint in all of physics. Each one is light thrown off as a single electron drops from a high shell to a lower one, and for a century they have been catalogued in one table: the Lyman series for every fall that ends on the first shell, Balmer for the second, Paschen for the third, then Brackett, Pfund and Humphreys reaching deeper into the infrared.

That table is built from one number. The Rydberg formula $1/\lambda = R(1/n_1^2 - 1/n_2^2)$ takes the shell the electron lands on (n_1), the shell it fell from (n_2), and a single constant R, and returns the wavelength of the line. Fix R and the whole grid is fixed with it. Conventional physics fixes it at R_∞ = 10,973,731.568157 m^{-1} and treats that as the same number in every laboratory and every age. This paper asks a different question: what does the table look like if the Rydberg is not one number but a family of register faces?

2. Five faces, one pattern

The companion paper, *The Rydberg Is Not a Constant*, shows that the quantity setting the hydrogen wavelengths carries not one value but a family of register faces, each a {2,3,5,π} value and each reproducing the spectrum on its own scale. Climbing from the lowest, the five we lay out here are: Face C, the pure-lattice value $10^7\pi^2/9$ = 10,966,227.11 m^{-1}, the spectrum read in the Earth-surface register; Face A, 10,967,215.73 m^{-1}, the celestial g_2 register the equalization shell itself sits on; the round-Hγ face, 10,971,428.57 m^{-1}, the one that lands Balmer-γ exactly on $5^6/36$ = 434.0277778 nanometres and Paschen-α on $3\cdot5^4$ = 1875; the G-bond face G2, 10,972,947.59 m^{-1}, one register step (the G-bond δ_G = 90.1506 ppm) below the Balmer node; and Face B, $10^{13}/(2\cdot3^6\cdot5^4)$ = 10,973,936.9 m^{-1}, the round-486 node built on the integer Hβ. The measured CODATA value, 10,973,731.568157 m^{-1}, is none of these — it is a single-register reading that falls inside the band the five faces mark out, 684 ppm above Face C and 18.7 ppm below Face B, and we print it last, beneath the family, for reference only.

So the experiment of this paper is simply to fill the grid in five times. Nothing about the structure changes: every face has the same six series, the same falls between the same shells, the same shape. What changes is where each line sits. Because a larger Rydberg packs more inverse-wavelength into every transition, the highest face gives the shortest wavelengths and the lowest face the longest. Face B is highest, so its whole spectrum is pulled very slightly to the blue; Face C is lowest, so its spectrum is nudged to the red; the three faces between thread the gap in order. The shift is small — a few hundred parts per million — but it is not noise. It is the register changing under the spectrum, and its size is the thickness of a seam inside the Earth.

3. How to read the grids

Each of the tables that follow is the entire hydrogen spectrum on one face. Read down the left-hand column to choose the series — the shell the electron lands on: Lyman lands on shell 1, Balmer on shell 2, and so on down to Humphreys on shell 6. Read across the top to choose the shell the electron fell from, n = 2 up to 11, and finally ∞, the series limit where the electron falls in from the very edge of the atom. The cell where a row and a column meet is the wavelength of that line in nanometres. The lower-left of each grid is blank, because an electron cannot fall onto a shell that sits above where it started.

Four lines are marked in teal on every grid — the anchors the companion paper derives by hand: Balmer-α (3→2), Hβ (4→2), Lyman-β (3→1) and the Paschen 3←6 line. On Face C these read 656.561270, 486.3416816, 102.587698 and 1094.268783 nanometres respectively, each at full precision and each a clean {2,3,5} multiple of the base unit. Comparing the same teal cell down the stack of grids is the quickest way to see the register shift: Balmer-α moves from 656.5613 on Face C, through 656.5021 on Face A and 656.2500 on the round-Hγ face, to 656.1000 on Face B — the line walking to the blue as the register climbs.

4. The base unit beneath every face

The grids differ in their Rydberg, but they share a deeper number that does not move at all. Take any clean line on any face and divide it by the small {2,3,5} rational that selects it, and the answer is always the same: 364.7562611 nanometres, the Moho equalization factor $3600/\pi^2$ — the Earth's no-distortion shell $20000/\pi$ written as a wavelength through the veil $180/\pi$. The Rydberg is what shifts between dimensions; the equalization factor is what stays. That is why the spectrum can be read from three registers and still be one spectrum: the faces are three views of a single T-structure, and the base unit is the structure itself.

The two outer faces do more than bracket the measurement. Run Balmer-α off Face C and carry it back through the veil and it returns the radius 6366.197724 km — the top of the Mohorovičić

discontinuity, the crust–mantle boundary. Run the same line off Face A and it returns 6365.623856 km — the bottom of that same seam. Their difference, 573.9 metres, is the physical thickness of the Moho. The spread you are about to see across the grids is, quite literally, the width of a boundary inside the Earth, written in the colours of hydrogen. The full derivation is given in the companion paper, *The Rydberg Is Not a Constant*.

Face C — the pure-lattice register · Earth surface

R = 10,966,227.11 m⁻¹

= $10^{7}\pi^{2}/9$ · G1, pure lattice

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5854	**102.5877**	97.2683	94.9886	93.7945	93.0888	92.6365	92.3289	92.1102	91.9490	91.1891
Balmer (n_1=2)		**656.5613**	**486.3417**	434.2336	410.3508	397.1790	389.0733	383.7046	379.9544	377.2266	364.7563
Paschen (n_1=3)			1,875.889	1,282.346	**1,094.269**	1,005.359	954.9982	923.2893	901.8699	886.6508	820.7016
Brackett (n_1=4)				4,052.847	2,626.245	2,166.431	1,945.367	1,818.170	1,736.935	1,681.353	1,459.025
Pfund (n_1=5)					7,460.924	4,654.442	3,741.090	3,297.462	3,039.636	2,873.405	2,279.727
Humphreys (n_1=6)						12,373.655	7,503.557	5,909.051	5,129.385	4,673.171	3,282.806

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at this register. Teal cells are the four anchor lines derived by hand in the companion paper. Blank cells are forbidden falls ($n_2 \le n_1$). The ∞ column is the series limit. Divide any clean line by its {2,3,5} rational and the result is the base unit 364.7562611 nm.

Face A — the celestial register · g_2

$R = 10{,}967{,}215.73\ m^{-1}$

the g_2 face the equalization shell sits on

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5745	**102.5785**	97.2596	94.9800	93.7860	93.0804	92.6282	92.3206	92.1019	91.9407	91.1808
Balmer (n_1=2)		**656.5021**	**486.2978**	434.1945	410.3138	397.1432	389.0383	383.6701	379.9202	377.1926	364.7234
Paschen (n_1=3)			1,875.720	1,282.231	**1,094.170**	1,005.269	954.9121	923.2061	901.7886	886.5709	820.6276
Brackett (n_1=4)				4,052.482	2,626.008	2,166.236	1,945.191	1,818.006	1,736.778	1,681.201	1,458.894
Pfund (n_1=5)					7,460.251	4,654.022	3,740.753	3,297.164	3,039.362	2,873.146	2,279.521
Humphreys (n_1=6)						12,372.539	7,502.881	5,908.519	5,128.923	4,672.750	3,282.510

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at this register. Teal cells are the four anchor lines derived by hand in the companion paper. Blank cells are forbidden falls ($n_2 \le n_1$). The ∞ column is the series limit. Divide any clean line by its {2,3,5} rational and the result is the base unit 364.7562611 nm.

Face Hγ — the round-Hγ register

R = 10,971,428.57 m⁻¹

lands Balmer-γ on 5⁶⁄36 = 434.0277778 and Paschen-α on 3·5⁴ = 1875

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5278	**102.5391**	97.2222	94.9436	93.7500	93.0447	92.5926	92.2852	92.0665	91.9054	91.1458
Balmer (n_1=2)		**656.2500**	**486.1111**	434.0278	410.1563	396.9907	388.8889	383.5227	379.7743	377.0477	364.5833
Paschen (n_1=3)			1,875.000	1,281.738	**1,093.750**	1,004.883	954.5455	922.8516	901.4423	886.2305	820.3125
Brackett (n_1=4)				4,050.926	2,625.000	2,165.404	1,944.444	1,817.308	1,736.111	1,680.556	1,458.333
Pfund (n_1=5)					7,457.386	4,652.235	3,739.316	3,295.898	3,038.194	2,872.043	2,278.646
Humphreys (n_1=6)						12,367.788	7,500.000	5,906.250	5,126.953	4,670.956	3,281.250

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at this register. Teal cells are the four anchor lines derived by hand in the companion paper. Blank cells are forbidden falls ($n_2 \le n_1$). The ∞ column is the series limit. Divide any clean line by its {2,3,5} rational and the result is the base unit 364.7562611 nm.

Face G2 — the G-bond register

R = 10,972,947.59 m⁻¹

= Face B × (1−δ_G) · one G-bond step (90.1506 ppm) below the Balmer node

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5110	**102.5249**	97.2088	94.9304	93.7370	93.0318	92.5798	92.2724	92.0538	91.8927	91.1332
Balmer (n_1=2)		**656.1592**	**486.0438**	433.9677	410.0995	396.9358	388.8351	383.4696	379.7217	376.9955	364.5329
Paschen (n_1=3)			1,874.740	1,281.561	**1,093.599**	1,004.744	954.4133	922.7238	901.3175	886.1078	820.1989
Brackett (n_1=4)				4,050.365	2,624.637	2,165.104	1,944.175	1,817.056	1,735.871	1,680.323	1,458.131
Pfund (n_1=5)					7,456.354	4,651.591	3,738.799	3,295.442	3,037.774	2,871.646	2,278.330
Humphreys (n_1=6)						12,366.076	7,498.962	5,905.432	5,126.243	4,670.309	3,280.796

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at this register. Teal cells are the four anchor lines derived by hand in the companion paper. Blank cells are forbidden falls ($n_2 \le n_1$). The ∞ column is the series limit. Divide any clean line by its {2,3,5} rational and the result is the base unit 364.7562611 nm.

Face B — the round-486 Balmer register

R = 10,973,936.9 m⁻¹

= $10^{13}/(2\cdot3^6\cdot5^4)$ · built on the integer Hβ

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5000	**102.5156**	97.2000	94.9219	93.7286	93.0234	92.5714	92.2641	92.0455	91.8844	91.1250
Balmer (n_1=2)		**656.1000**	**486.0000**	433.9286	410.0625	396.9000	388.8000	383.4351	379.6875	376.9615	364.5000
Paschen (n_1=3)			1,874.571	1,281.445	**1,093.500**	1,004.653	954.3273	922.6406	901.2363	886.0279	820.1250
Brackett (n_1=4)				4,050.000	2,624.400	2,164.909	1,944.000	1,816.892	1,735.714	1,680.171	1,458.000
Pfund (n_1=5)					7,455.682	4,651.172	3,738.462	3,295.145	3,037.500	2,871.387	2,278.125
Humphreys (n_1=6)						12,364.962	7,498.286	5,904.900	5,125.781	4,669.888	3,280.500

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at this register. Teal cells are the four anchor lines derived by hand in the companion paper. Blank cells are forbidden falls ($n_2 \le n_1$). The ∞ column is the series limit. Divide any clean line by its {2,3,5} rational and the result is the base unit 364.7562611 nm.

Reference — the conventional CODATA Rydberg — reference only

R = 10,973,731.568157 m⁻¹

measured single-register value · not a T face · shown beneath the family for comparison

Series (lands on n_1 ↓)	2	3	4	5	6	7	8	9	10	11	∞
Lyman (n_1=1)	121.5023	102.5175	97.2018	94.9237	93.7303	93.0252	92.5732	92.2658	92.0472	91.8861	91.1267
Balmer (n_1=2)		656.1123	486.0091	433.9367	410.0702	396.9074	388.8073	383.4422	379.6946	376.9686	364.5068
Paschen (n_1=3)			1,874.607	1,281.469	1,093.520	1,004.672	954.3451	922.6579	901.2531	886.0445	820.1403
Brackett (n_1=4)				4,050.076	2,624.449	2,164.950	1,944.036	1,816.926	1,735.747	1,680.203	1,458.027
Pfund (n_1=5)					7,455.821	4,651.259	3,738.531	3,295.207	3,037.557	2,871.440	2,278.168
Humphreys (n_1=6)						12,365.193	7,498.426	5,905.010	5,125.877	4,669.976	3,280.561

Wavelengths in nanometres for every hydrogen transition $n_2 \to n_1$ at the conventional CODATA Rydberg. This grid is shown for reference only — it is a single-register measurement, not a T face, and its anchor lines are therefore not marked. Every line here falls inside the band the five faces above define.

The register shift, line by line — the same anchors across all five faces

Anchor line	Face C	Face A	Face Hγ	Face G2	Face B	CODATA*	spread C→B
Balmer-α (3→2)	656.56127	656.50209	656.25000	656.15915	656.10000	656.11228	703 ppm
Balmer-γ (5→2)	434.23364	434.19450	434.02778	433.96769	433.92857	433.93669	703 ppm
Hβ (4→2)	486.34168	486.29784	486.11111	486.04382	486.00000	486.00909	703 ppm
Lyman-β (3→1)	102.58770	102.57845	102.53906	102.52487	102.51563	102.51754	703 ppm
Paschen 3←6 (6→3)	1,094.26878	1,094.17014	1,093.75000	1,093.59859	1,093.50000	1,093.52046	703 ppm

*Each anchor walks to the blue (shorter wavelength) as the register climbs from Face C to Face B. The spread — a few hundred ppm — is the same width on every line, because it is one register step, not a scatter. The round-Hγ face lands Balmer-γ on exactly 434.0277778. *CODATA is the conventional measured value, shown for reference only — not a T face; it falls inside the band on every row.*

References

[1] S. Daubney, *The Rydberg Is Not a Constant — Its Three Faces Are Register Values of the Moho Seam*. The Daubney Foundation (2026).

[2] S. Daubney, *The Universal Force of Time — Master Compendium v5*. The Daubney Foundation (2026).

[3] NIST Atomic Spectra Database; CODATA 2018, Rydberg constant R∞, Fundamental Physical Constants.

[4] S. Daubney, *The Cascade — One Ladder from the Sodium Line to the Speed of Light*. The Daubney Foundation (2026).

The Conversion Loop — the gears behind the grids

Every wavelength in the three grids is one T-value read in a chosen register. Apply the fixed gears below to walk any line from its shell pair to its wavelength, to the base unit, and on to the Earth radius the two faces return.

from → to	apply (number-first)	lattice
shell pair (n_1,n_2) → wavelength λ	$\lambda = 1 / [\ R(1/n_1^2 - 1/n_2^2)\ ]$	Rydberg formula
wavelength λ → base unit	÷ {2,3,5} rational of the line	line selector
radius (km) → wavelength (nm)	× (180/π) / 1000	veil 180/π
Rydberg face → Earth radius	×5/36 → invert → ÷36 ×2 ×10 → ÷veil ×1000	Hα chain
Face C ↔ Face A	× (1 ∓ register step)	Moho seam
wavelength λ → flow of time g	÷ 49.50355350	3888/25π
flow of time g → dimensional spin-orbit value c	$c = g^2 \times 3{,}110{,}400$	864·3600

Key. *Flow of time (metres per second) = what science calls gravitational free fall. Dimensional spin-orbit value = what science calls the speed of light. Veil = 180/π, the degree–radian offset.*

A Note on the Numbers

The values in this paper are written as plain numbers — not pinned to units, and not carried to a particular power of ten. This is not loose notation; it is the physics. Under the Force of Time a quantity is not the property of one dimension: the same T-value shows up as a wavelength in an atom, a span of time in the heavens, a mass in a nucleus, an angle in an orbit — one number wearing different coats. That is why a hydrogen line in nanometres can meet the radius of the Earth in kilometres and land on the same value: they were never separate quantities. The unit and the power of ten are only the costume the number wears in whichever dimension you read it from.

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