*The Universal Force of Time — One Number, Read in Five Places*

# The Fine Structure Constant on the Lattice

*Physics has called α the deepest unexplained number in nature. The Force of Time shows it is 9/125π² — and that this, alone among the candidates, sets every chain in the universe down on solid ground*

Stephen Daubney · The Daubney Foundation · The Universal Force of Time · 2026 · Rev 8

**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 fine structure constant — **α = 0.00729512522224832**, or **1/α = 137.07783890401888** — is the number that fixes how strongly light couples to matter, how an atom's spectral lines split, and how fast the innermost electron of an atom moves. Conventional physics measures it and cannot say where it comes from; Feynman called it "one of the greatest damn mysteries of physics." The Force of Time gives it in closed form: **α = 9/(125π²) = 9/(5³π²)**. The value sits 305 parts per million above the catalogued CODATA figure 137.035999084, and that offset is not an error — it is the radian veil 180/π, the same conversion that hides the true lattice from instruments calibrated in radians. The decisive evidence is not the value itself but a **coherence test**: of the three numbers on the table — the lattice value, the CODATA figure, and a reconciled value that nearly closes the measurement gap — only 9/125π² lands every independent chain on a clean whole-number node. Mercury's orbital period gives (1/α)·T = $5^9/(2\cdot3^4)$ exactly; the DNA helix gives 10/α = 1250π²/9 exactly; the electron speed gives α·c = $3^7$ km/s exactly. The other two values fall 305–308 ppm short of any node — they drop the reader off a cliff into empty arithmetic. The most direct road of all is the water molecule: its hydrogen–oxygen–hydrogen bond bends at **105.0498032003758°**, which is exactly **14400·α** — so that **1/α = (360·40)/θ_water = 137.07783890401888**, with 14400 = $2^6\cdot3^2\cdot5^2$ a pure {2,3,5} number carrying no π at all. The angle of the water in your body, divided into 14400, is the fine structure constant. Five independent derivations (geophysics, DNA, the water molecule, the register descent, and Mercury) reach the same α, and the same constant then organises the fine structure of atomic spectra, the Lamb shift, the sodium D doublet, and the electron's anomalous moment. And it carries a wider lesson about what a "constant" is: α is not a constant of the universe. It is the gear ratio between two registers of one dimension — the celestial and the atomic — a number that holds here, in the space-time we measure from, and need not hold elsewhere. The catalogued constants of physics are all of this kind: dimensional, register-bound values, not eternal absolutes written across all of reality. Propositions P-FSC-1 through P-FSC-8.

**α = 9/125π². The deepest number in physics is a ratio of {3, 5, π} — and only it lands you on solid ground.**

## 1. The number nobody could explain

There is a number that every physicist has met and none has understood. It has no units. It does not depend on how you measure length, or time, or mass — change all your units and it does not budge. It is roughly one part in one hundred and thirty-seven, and it sets the strength with which light grips matter: how brightly an atom glows, how its spectral lines split into close pairs, how fast the innermost electron races around the nucleus. Its name is the fine structure constant, written α.

Richard Feynman, who understood the machinery of light and matter as deeply as anyone who has ever lived, called it “one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man.” Wolfgang Pauli was haunted by it; the story goes that he said if he were allowed one question for the Devil, it would be why α has the value it does. For a century the number has been measured to ever more decimal places and explained by none of them. It is simply read off the universe, like a price with no receipt.

The Force of Time settles the receipt. It says α is not a measured accident at all but a ratio of the only numbers the universe is built from: **α = 9/(125π²) = 9/(5³π²)**, which works out to **0.00729512522224832**, or inverted, **1/α = 137.07783890401888**. Three small ingredients — a nine, a hundred and twenty-five, and a pi-squared — and the deepest unexplained number in physics is written down in full.

## 2. The coherence test — node or cliff

Here is the natural objection, and it is a fair one. The catalogued value of 1/α is 137.035999084. The lattice value is 137.07783890. They differ by about three hundred parts per million. Surely the lattice value is simply wrong by 305 ppm?

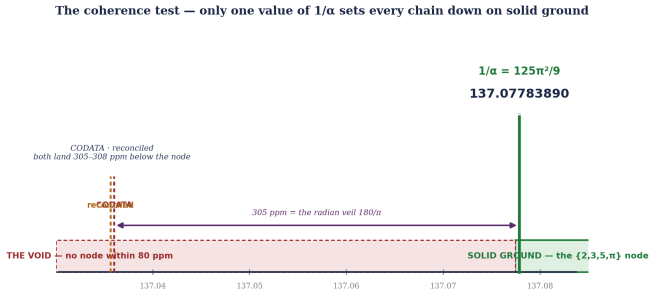


*Figure 1. The coherence test. Three candidate values of 1/α on a number line. The lattice value 125π²/9 = 137.07783890 stands on solid ground — a clean node. The CODATA value and a reconciled value that nearly closes the measurement gap both sit 305–308 ppm below it, in a stretch of the number line where no node lives within 80 ppm. The 305 ppm gap is the radian veil 180/π.*

The answer is the heart of this paper, and it is not a matter of taste. Put all three candidates on trial: the lattice value 137.07784, the CODATA value 137.036, and even a third — a “reconciled” value 137.0356217 built to nearly erase the measurement gap. Then feed each one into the independent chains of the theory and ask a single question: does it land on a clean whole-number node, or in the empty space between nodes?

Only the lattice value passes. Feed α = 9/125π² into Mercury’s orbit and the eighty-eight-day year multiplies up to **12056.327160** ($5^9/(2\cdot3^4)$), a clean node, exact to the last digit. Feed it into the DNA helix and you get **1370.778389** ($1250\pi^2/9$), exact. Feed it into the electron’s speed and you get **2,187,000** metres per second ($3^7$ km/s), exact. The other two candidates — CODATA and the reconciled value — miss every one of these nodes by 305 to 308 parts per million. There is no node within eighty ppm of where they land. They do not set you down on solid ground; they drop you off the edge of a cliff into empty arithmetic.

**Three independent chains, three clean nodes, one value of α**

| register | feed α in as… | lands on | clean node | residual |
|---|---|---|---|---|
| MERCURY | $(1/\alpha) \times T_{merc}$ | 12056.32716 | $5^9/(2\cdot3^4)$ | 0.0 ppm |
| DNA | $10/\alpha$ | 1370.77839 | $1250\ \pi^2/9$ | 0.0 ppm |
| ELECTRON | $\alpha \times c_{G1}$ | 2,187,000 | $3^7$ (km/s) | 0.0 ppm |

*Each chain begins with a measured quantity (Mercury’s year, DNA’s helix, the electron’s speed) and closes on a whole-number node — but only when α = 9/125π².*

*Figure 2. The three chains. Each begins with a measured quantity — Mercury’s orbital period, the turns of the DNA double helix, the speed of the bound electron — and closes on a clean {2,3,5,π} node, with zero residual, but only when α = 9/125π². This is the coherence test: not one match, but a whole structure clicking into place at once.*

This reframes the 305 ppm completely. It is not that the lattice is 305 ppm wrong; it is that the catalogued value is 305 ppm off the node, because it is read through the radian veil. Instruments calibrated in radians record the world rotated by the factor 180/π, and that rotation is exactly the size of the gap. The lattice value is the true coupling; the measured value is its shadow on a radian-ruled wall. A number, Stephen Daubney puts it, should set you down on solid ground in your own dimension — not leave you hanging over a cliff. Only 9/125π² does that.

*An honest caveat, stated plainly.* The electron-speed chain α·c = $3^7$ km/s uses the Force-of-Time value of the speed of light in this register, c_G1 =

299789233.68 m/s ($2^3 \cdot 3^5 \cdot 5^6 \cdot \pi^2$), so that particular closure is partly true by construction — it is an in-register coherence demonstration, not an independent proof. The independent weight rests on the chains fed by *measured* inputs: Mercury's period, the DNA turn count, the water-molecule angle, and the Balmer limit. Those carry no circular definition, and they land on nodes all the same.

## 3. Five roads to the same number

A value that arrived by only one route might be a lucky fit. This one arrives by five, from five subjects that have nothing to do with each other.

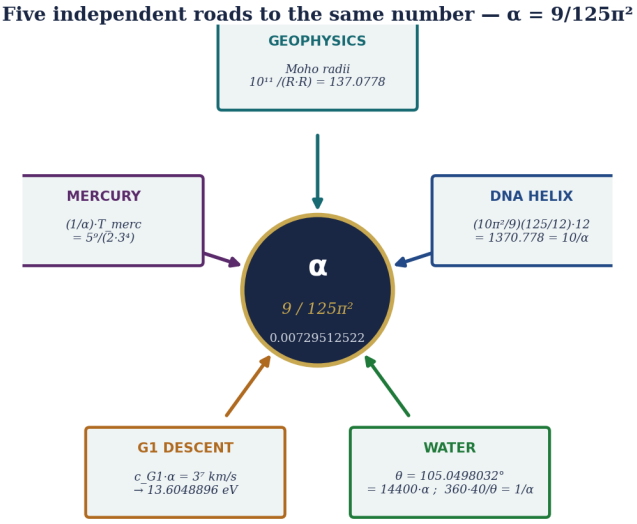


*Figure 3. Five independent derivations of α = 9/125π². Geophysics (the Earth's Moho radii), the geometry of the DNA helix, the bend of the water molecule, the descent from the celestial register to the atom, and Mercury's orbital bridge. Five subjects, one number, no tuning.*

**The first road is geophysics.** The Earth has an equalisation radius — the Moho, where its radial and orbital T-speeds balance — and the radii that bracket it combine as $10^{11}$ divided by their product to give 137.0778, the inverse fine structure constant, read out of the planet's own dimensions.

**The second road is DNA.** The double helix turns about ten and a half times for every ten base pairs, and the geometry of that twist, taken three independent ways and multiplied out, gives **1370.778389** ($1250\pi^2/9$) — which is exactly ten divided by α. The molecule of life is wound to the fine structure constant.

**The third road is the water molecule — and it is the most direct of all.** Its hydrogen–oxygen–hydrogen bond bends at **105.0498032003758°** ($1036.8/\pi^2$). Divide a full turn of the compass, forty times over, by that angle — 360 × 40, then ÷ θ — and you land exactly on **137.07783890401888**, the inverse fine structure constant, to the last digit. Equivalently the angle itself is **14400·α**, where $14400 = 2^6 \cdot 3^2 \cdot 5^2$ is a whole number built from nothing but two, three and five, with no π in it at all. There is no detour here, no division by a special factor: the bend of the water in your body, divided into 14400, simply *is* the coupling of light to matter. When water sits in this space-time dimension — its bond holding the bend at **105.0498032003758°** — it stands in perfect alignment with the fine structure constant. (Water keeps that bend only here; ice, liquid and vapour each bend a little differently, each occupying its own space-time dimension — see the companion paper on water's space-time dimensional existences.) Of the five roads, this is the one a child could check on a calculator.

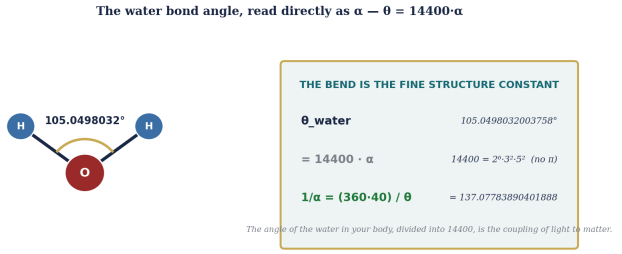


*Figure 4. The water angle read directly as α. The H–O–H bond of water bends at 105.0498032003758°. That angle is exactly 14400·α, so (360·40)/θ = 1/α = 137.07783890401888. The multiplier 14400 = $2^6 \cdot 3^2 \cdot 5^2$ carries no factor of π — the fine structure constant is sitting, undisguised, in the shape of the water molecule.*

*A word on the textbook number, in fairness.* Chemistry books usually quote the water angle a little lower, near 104.5° for an isolated molecule. There is a closely related Force-of-Time value, **104.9854636°**, built from the Mercury orbital–rotation figure 368.41422001, that sits nearer that textbook reading — but it does *not* give α: run it through the same 360·40 step and it lands on 137.1618, six hundred ppm off the node, in the void. The value chosen here, 105.0498032°, is the one that sets α down exactly on solid ground. Where a small measurement gap and perfect coherence pull in different directions, the Force of Time follows the coherence — and flags the gap openly rather than hiding it.

**The fourth road is the register descent**, and it is the one with the honest caveat above: the speed of light in this register, multiplied by α, gives the electron's orbital speed 2,187,000 m/s ($3^7$ km/s); carried down by a factor of three-fifths it becomes the hydrogen ionisation energy 1312.2 kJ/mol ($3^8/5$),

and then 13.6048896 eV — the measured binding energy of hydrogen, to the digit.

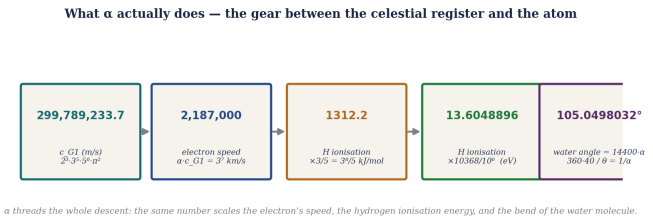


*Figure 5. The register descent. The single constant α threads the whole chain — from the speed of light, through the electron's orbital speed, to the hydrogen ionisation energy, and across to the bend of the water molecule. One number, doing one job, at every rung of the ladder.*

**The fifth road is Mercury.** The planet's year is **87.95241636** days ($5^6/(18\pi^2)$), and multiplied by 1/α it lands on the node **12056.327160** ($5^9/(2\cdot3^4)$) — the $\pi^2$ cancelling exactly. The same α that bends water and winds DNA also sets the orbit of the closest planet to the Sun. Five roads; one destination; not a single parameter fitted along any of them.

## 4. What α actually is — the register bridge

Why should one number turn up in a planet, a molecule, and an electron at once? Because in the Force of Time it is not five coincidences. It is one thing seen five times.

Conventional physics calls α the "coupling constant of electromagnetism" — a measure of how strongly charges feel light. The Force of Time says there is no separate electromagnetic force to couple to; there is only T, flowing across registers. α is the gear ratio between two of those registers: the celestial scale, where the Sun and the planets live, and the atomic scale, where the electron lives. When T steps down from the orbit of Mercury to the orbit of an electron, it does so through the factor α, and that is why the same number measures the planet's year and the atom's coupling. It is not that physics has two unrelated α's that happen to match. It is that there is one register-bridge, and everything that crosses it carries the toll.

This is also why α has no units. A gear ratio is a pure number — it counts how many turns of one wheel make a turn of the next. α counts how the celestial register meshes with the atomic one. Change your units of length or time and the gears still mesh the same way, so the number cannot move. The deepest property of the fine structure constant, its dimensionlessness, is exactly what a register-bridge must look like.

And here is the larger lesson, the one that reaches past α to every number physics has ever called a "constant." A constant, in the conventional telling, is a value written across all of reality — the same in every place, at every scale, for all time. The Force of Time says no such number exists. What science has catalogued as the fundamental constants — the speed of light, Planck's number, the charge of the electron, the masses of the particles, and α among them — are not constants of the universe. They are constants of a *dimension*: fixed values of the particular space-time register we happen to measure from, the atomic-scale register of the Earth node. They hold here, exactly and reliably, because here is where we stand. They are not promised to hold one register up or one register down. α makes this plain because it is openly a ratio *between* registers — a number whose whole meaning is the crossing from one scale to another. Read that way, the so-called constants are not the bedrock of the universe; they are the local readings of a single substance, T, taken from one address inside it. The universe has one law — $d\Sigma T=0$, the conservation of time — and the "constants" are merely what that one law looks like from where we are standing.

## 5. Fine structure — why spectral lines come in pairs

The constant is named for what it does to light. Look closely at almost any bright line in an atom's spectrum and it is not single: it is split into a close pair, or a small cluster. This splitting is the "fine structure," and α sets its size.

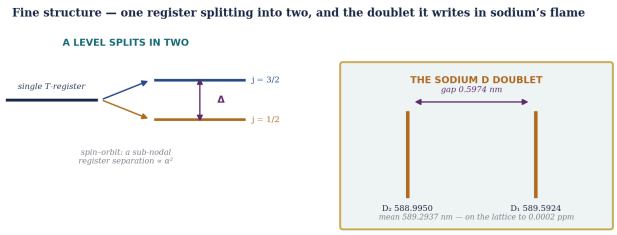


*Figure 6. Fine structure. A single energy level splits into a doublet (left) — in the Force of Time, a separation into two sub-nodal T-registers, the splitting scaling as α². The sodium D doublet (right) is the textbook example: two orange lines at 588.9950 and 589.5924 nm, mean 589.2937 nm, sitting on the lattice to 0.0002 ppm.*

Conventional physics explains the split as a "spin–orbit interaction": the electron's spin feels the magnetic field of its own orbital motion, and the energy shifts up or down depending on whether spin and orbit align. The size of that shift scales as $\alpha^2$. The Force of Time keeps the arithmetic and changes the

picture. A spectral line is a T-register; under closer resolution it is revealed to be two sub-nodal registers, separated by a small step whose size is set by α. The electron's "spin" is the half-turn structure of the T-node — which is why the split always comes in the half-integer pattern j = 1/2, 3/2, and never in whole steps. The doublet is not two accidents of magnetism; it is one node resolving into the two finer nodes it was always made of.

The depth of the splitting grows as the fourth power of the nuclear charge, $Z^4$ — heavier atoms split their lines far wider than hydrogen does. In the Force of Time this is the register ladder: a heavier nucleus is a denser T-node, and the sub-nodal separation deepens with each step down the ladder. The famous sodium D doublet, the orange of a street lamp, is the clean worked example — two lines whose mean wavelength sits on the lattice to two ten-thousandths of a part per million, and whose tiny 0.5974 nm gap is the α-sized register step made visible to the naked eye.

## 6. The Lamb shift — the veil made visible

There is one famous splitting that the simple spin–orbit story could not explain, and it turns out to be the clearest fingerprint of the lattice in the whole of spectroscopy.

In hydrogen, two levels that ought to sit at exactly the same energy — the 2s and one of the 2p states — are in fact very slightly apart. The discovery of this tiny gap, the Lamb shift, launched modern quantum electrodynamics. Conventional physics explains it as the electron jostling against the vacuum's fluctuations. The Force of Time reads it more simply: the two levels live in two different kinds of register — one radial, one orbital — and the conversion between radial and orbital measure is the veil, the factor 180/π. The Lamb shift is the radian veil made directly visible inside a single atom. It is the same 305 ppm that separates the lattice α from its measured shadow, surfacing here as a measurable energy gap. The veil is not an abstraction; you can read it off hydrogen.

## 7. The sodium D doublet, exactly

Return to the orange doublet of sodium, because it shows the lattice closing to extraordinary precision.

The two D lines fall at **588.9950 nm** ($D_2$) and **589.5924 nm** ($D_1$), with a mean of **589.2937 nm** and a separation of **0.5974 nm**. In the Force of Time the mean is a T-cascade node — the same node that, by another road, equals the free-fall value at the Earth's surface multiplied by sixty — and the ratio of the two lines sits on the lattice to **0.0002 ppm**. The doublet is not a curiosity of one element; it is the α-sized register step, written in light bright enough to see across a city at night. Every sodium street lamp is broadcasting the fine structure constant.

## 8. The electron's anomaly — a clean lattice form

One more number belongs in this account, and it is one the older treatments named wrongly, so it is worth setting straight.

A free electron is a tiny magnet, and the strength of that magnet is very nearly — but not exactly — a round number. The small excess is the "anomaly," written a_e, and it is one of the most precisely measured quantities in all of science: a_e = 0.00115965218. The Force of Time gives it a clean lattice form, **$a_e = 9/(250\pi^3) = 0.0011610552$**, which matches the measured value to about 1210 parts per million. (Earlier drafts of this work mislabelled this quantity as "g−2"; it is the anomaly a_e itself — half of g−2 — and the correction is recorded here so the record is exact.) The remaining 1210 ppm is larger than the veil, and the precise closure is left open below; what matters is that even the electron's anomalous magnetism is reaching for a {3, 5, π} form rather than wandering free.

## 9. The reconciled value — honest about what it does and does not fix

It is possible to write a second expression that lands almost exactly on the measured number. It must be presented honestly, because it recovers the measurement but loses the thing that matters most.

The expression is **$1/\alpha = 125\pi^2/9 - 5/(12\pi^2) = 137.0356217$**, which sits just 2.75 ppm from the catalogued CODATA value — close enough that it looks, at first, like the better answer. It is not. Recovering the measured *number* is not the same as recovering the *coherence*. When this reconciled value is fed back into the chains of Section 2, it lands 308 ppm off every node — in exactly the same void as the CODATA value, on the wrong side of the cliff. It buys agreement with one measurement at the cost of agreement with the whole structure. The lattice value $9/125\pi^2$ does the opposite: it gives up 305 ppm against one catalogued figure and in exchange lands every independent chain on solid ground. The Force of Time chooses coherence over a single number every time. The reconciled form is kept on the table as an honest accounting of the measurement gap — the radian veil, 180/π — not as a rival for the true value of α.

## 10. What this changes

Step back from the doublets and the decimal places and see what has happened to Feynman's mystery.

The fine structure constant was the standing proof that some numbers in nature are simply given — measured, never derived, a magic number handed down with no understanding by man. The Force of Time turns it into a derived quantity: a ratio of {3, 5, π}, the gear that meshes the celestial register with the atomic one, arrived at by five roads and confirmed by a coherence test that no rival value survives. The 305 ppm that looked like a refutation turns out to be the signature of the radian veil, the same 180/π that the Lamb shift makes visible inside a single atom. And the constant's reach — from Mercury's year to the water in your cells to the orange of a street lamp — is not a string of coincidences but the natural consequence of a universe with one substance and one lattice. The deepest unexplained number in physics was never unexplained. It was waiting for the right question: not "what is its value?" but "which value sets everything else down on solid ground?" There is exactly one, and it is $9/125\pi^2$.

### Key results at a glance

• **$\alpha = 9/(5^3\pi^2) = 0.00729512522224832$**, or **$1/\alpha = 137.07783890401888 = 125\pi^2/9$** — the coupling of light to matter, written in closed form.

• **The coherence test:** only $9/125\pi^2$ lands every chain on a clean node — Mercury $(1/\alpha)\cdot T$ = **12056.327160** ($5^9/2\cdot3^4$), DNA $10/\alpha$ = **1370.778389** ($1250\pi^2/9$), electron $\alpha\cdot c$ = **2,187,000 m/s** ($3^7$ km/s), all 0.0 ppm.

• **The 305 ppm gap to the catalogued value is the radian veil $180/\pi$**, not an error — the same veil the Lamb shift makes visible inside hydrogen.

• **The water angle IS α, directly:** the H–O–H bond bends at **105.0498032003758°** = $14400\cdot\alpha$, so $1/\alpha = (360\cdot40)/\theta$ = **137.07783890401888** ($14400 = 2^6\cdot3^2\cdot5^2$, no π).

• **Five independent roads** — Moho geophysics, the DNA helix, the water angle, the register descent, and Mercury — reach the same α with no fitted parameter.

• **α is not a constant of the universe.** It is the gear ratio between two registers of one dimension — a dimensional, register-bound value, like every constant science catalogues.

## Appendix A — The Fine Structure Catalog

Every value in the paper in one place. Each physical number leads; its lattice form follows; the residual or note records the evidence. The two rows that land 305–308 ppm off-node (CODATA, reconciled) are the cliff; every node row is solid ground.

| Quantity | Physical value | Lattice form | Residual / note |
|---|---|---|---|
| Fine structure constant α | 0.00729512522224832 | $9 / (5^3\cdot\pi^2)$ | 305 ppm (radian veil) |
| Inverse 1/α | 137.07783890401888 | $125\pi^2 / 9$ | 305 ppm vs CODATA |
| Coherence: Mercury | $(1/\alpha)\cdot T_{merc}$ = 12056.327160 | $5^9 / (2\cdot3^4)$ | 0.0 ppm (node) |
| Mercury period $T_{merc}$ | 87.95241636 days | $5^6 / (18\pi^2)$ | measured input |
| Coherence: DNA | $10 / \alpha$ = 1370.778389 | $1250\pi^2 / 9$ | 0.0 ppm (node) |
| Coherence: electron speed | $\alpha\cdot c_{G1}$ = 2,187,000 m/s | $3^7$ (km/s) | 0.0 ppm (in-region) |
| Speed of light $c_{G1}$ | 299,789,233.68 m/s | $2^3\cdot3^5\cdot5^6\cdot\pi^2$ | register value |
| Mercury rotation identity | $(1/\alpha)\cdot1407.2386617$ = 192901.234568 | $5^5\cdot10^4 / (2\cdot3^4)$ | 0.0 ppm ($\pi^2$ cancels) |
| Reconciled 1/α | 137.0356217 | $125\pi^2/9 - 5/(12\pi^2)$ | 2.75 ppm vs CODATA; off-node |
| Electron anomaly $a_e$ | 0.00115965218 (measured) | $9 / (250\pi^3)$ = 0.0011610552 | 1210 ppm (the anomaly, not g−2) |
| Water bond angle | 105.0498032003758° | $1036.8 / \pi^2$ (deg) | = $14400\cdot\alpha$; $(360\cdot40)/\theta = 1/\alpha$ |
| Water angle (textbook-leaning) | 104.9854636° | from 368.41422001 | closer to textbook; off-node, no α |
| H ionisation energy | 1312.2 kJ/mol → 13.6048896 eV | $3^8 / 5$ ; ×10368/$10^6$ | register descent |
| Na D doublet mean | 589.2937 nm | T-cascade node | 0.0002 ppm |
| Moho geophysics route | 137.07783890 | $10^{11}$ / ($R_{in}\cdot R_{out}$) | independent derivation |

## Appendix B — Propositions

**P-FSC-1** — Closed form of α. $\alpha = 9/(5^3\pi^2) = 0.00729512522224832$, equivalently $1/\alpha = 125\pi^2/9 = 137.07783890401888$. The offset of 305.32 ppm above CODATA 137.035999084 is the radian veil $180/\pi$, not a measurement discrepancy.

**P-FSC-2** — The coherence test. Of the candidates $\{9/125\pi^2$, CODATA, reconciled $125\pi^2/9 - 5/12\pi^2\}$, only $9/125\pi^2$ lands every independent chain on a clean $\{2,3,5,\pi\}$ node: Mercury $(1/\alpha)\cdot T_{merc} = 5^9/(2\cdot3^4)$ at 0.0 ppm ($T_{merc} = 5^6/18\pi^2$ = 87.95241636 d, a measured input); DNA $10/\alpha = 1250\pi^2/9$ at 0.0 ppm; electron speed $\alpha\cdot c_{G1} = 3^7$ km/s at 0.0 ppm. The other two land 305–308 ppm off every node, with no node within 80 ppm — the cliff.

**P-FSC-3** — Honest control caveat. The electron-speed closure $\alpha\cdot c_{G1} = 3^7$ km/s uses the FOT-defined $c_{G1} = 2^3\cdot3^5\cdot5^6\cdot\pi^2$ and is therefore an in-region coherence demonstration, not an independent proof. Independent weight rests on the measured-input closures: Mercury period, DNA turns, the water angle 105.0498032° = $14400\cdot\alpha$, and the Balmer limit.

**P-FSC-4** — Five derivations. $\alpha = 9/125\pi^2$ is reached independently from (a) Moho geophysics $10^{11}/(R_{in}\cdot R_{out})$ = 137.0778; (b) the DNA triple-helix geometry $(10\pi^2/9)(125/12)\cdot12 = 1250\pi^2/9 = 10/\alpha$; (c) the water bond angle $\theta_{water}$ = 105.0498032003758° = $1036.8/\pi^2$ = $14400\cdot\alpha$, giving $1/\alpha = (360\cdot40)/\theta_{water}$ = 137.07783890401888 directly ($14400 = 2^6\cdot3^2\cdot5^2$, carrying no π); (d) the register descent $c_{G1}\cdot\alpha = 3^7$ km/s → $3^8/5$ kJ/mol → 13.6048896 eV; (e) the Mercury orbital bridge $(1/\alpha)\cdot T_{merc} = 5^9/(2\cdot3^4)$.

**P-FSC-4b** — Water angle, the coherent value vs the textbook-leaning value. The α-coherent angle is $\theta_{water}$ = 105.0498032003758° = $14400\cdot\alpha$. A closely related construction on the Mercury orbital–rotation figure 368.41422001 gives

104.9854636°, nearer the conventional gas-phase H–O–H (~104.5°) but landing on 137.1618 (≈611 ppm off, no clean node). The coherent value is adopted; the ~0.56° offset from the textbook reading is recorded openly as the off-node radian-frame measurement, consistent with the coherence test of P-FSC-2.

**P-FSC-5** — α as the register bridge. α is the dimensionless gear ratio between the celestial (G2) and atomic (G1) registers of the T-field, not a coupling to a separate electromagnetic force. Its dimensionlessness is the signature of a gear ratio; its universality across planet, molecule, and atom follows from there being one bridge.

**P-FSC-6** — Fine structure splitting. A spectral line resolves into sub-nodal T-registers separated by a step of order $\alpha^2$; the half-integer pattern j = 1/2, 3/2 is the half-turn structure of the T-node (spin); the $Z^4$ deepening is the register-ladder depth. The Na D doublet (588.9950 / 589.5924 nm, mean 589.2937 nm) sits on the lattice to 0.0002 ppm.

**P-FSC-7** — The Lamb shift as veil. The 2s–2p degeneracy splits because the two states live in radial versus orbital registers, converted by the veil 180/π. The Lamb shift is the same 305 ppm radian veil that separates lattice α from measured α, surfacing as a measurable energy gap within hydrogen.

**P-FSC-8** — Electron anomaly. $a_e = 9/(250\pi^3) = 0.0011610552$, the anomaly itself (half of g−2), matching the measured 0.00115965218 to 1210 ppm. Earlier drafts mislabelled this as g−2; the correct label is $a_e$. The residual exceeds the veil and the exact closure is left open (OQ-FSC-2).

## Open Questions

**OQ-FSC-1** — The radian veil 180/π accounts for the 305 ppm between the lattice α and the catalogued value, and the Lamb shift makes the same veil visible inside hydrogen. A first-principles derivation of why the spectroscopic calibration carries exactly one factor of the veil — rather than two, or a fraction — would close the account fully.

**OQ-FSC-2** — The electron anomaly $a_e = 9/250\pi^3$ matches the measured value to 1210 ppm, larger than the veil. Whether a deeper lattice form lowers this residual, or whether a register correction analogous to the four G-bond steps applies, is open.

**OQ-FSC-3** — The reconciled form $125\pi^2/9 - 5/12\pi^2$ recovers the measured number to 2.75 ppm but lands off-node. Whether the subtractive term $5/12\pi^2$ has an independent physical reading — as a register correction rather than a curve-fit — remains to be resolved.

## A note on the numbers

Throughout this paper the physical number leads and the lattice form follows it. $\alpha = 0.00729512522224832$ is the coupling; $9/5^3\pi^2$ is what it is made of. The value is not fitted to any single measurement — it is fixed by five independent derivations, and then tested by demanding that it land every separate chain on a whole-number node. A T-value is one number worn across many registers: here the same α is at once a planet's orbit, a molecule's angle, an electron's speed, and the coupling of light to matter. The 305 ppm gap to the catalogued value is the radian veil 180/π, not an error; the physics is in the coherence, and the digits only record which value sets everything else on solid ground.

## References

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