THE UNIVERSAL FORCE OF TIME

Chlorophyll and the Light of the Lattice

The leaf as a T-transducer — 432 nm = $2^4\times3^3$ · 648 nm = $2^3\times3^4$ · green 540 nm = $2^2\times3^3\times5$ · and the two reaction centres that read the leaf's two working atoms, hydrogen and nitrogen, each × 50

Stephen Daubney · The Daubney Foundation · 2026 · Rev 3

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

Walk into a forest in full sun and you are standing inside a calculation. Chlorophyll harvests light at two exact lattice nodes — **432 nm** ($2^4\times3^3$) in the blue and **648 nm** ($2^3\times3^4$) in the red — and reflects the {2,3,5} equilibrium node between them, **540 nm** ($2^2\times3^3\times5$), which is why the living world is green. The two harvesting peaks hold the most fundamental T-ratio, 432:648 = 2:3; the green node closes a single coherent structure with 540/432 = 5/4 and 648/540 = 6/5. The blue node is also the H–H bond energy, 432 kJ/mol — one number wearing a wavelength in one register and a bond in another. The two reaction centres have long carried apparent factors of seven; they do not. Each is one of the leaf's two working atoms lifted into visible light by exactly 50. **P680 = 680.24448 nm** is the hydrogen ionization energy **13.6048896** ($2^8\times3^{12}\times10^{-7}$) × 50 ($2^9\times3^{12}\times5^2\times10^{-7}$) — fitting because Photosystem 2 splits water and so ionises hydrogen. **P700 = 700.3320213 nm** is the atomic weight of **nitrogen**, **14.00664043** ($2^9\times3^3/100\pi^2$), × 50 = $6912/\pi^2$ ($2^8\times3^3/\pi^2$) — fitting because nitrogen is the literal heart of the molecule: four nitrogen atoms coordinate the central magnesium of every chlorophyll ring. The leaf still reaches the planet — nitrogen's mass, 14.00664043 Daltons, carries through to the Earth's sidereal rotation, 23564.069 s, to **0.0003 ppm**. One leaf reaches from its two working atoms to the spin of the world. The hydrogen node that splits water is also the node that sets the speed of light: the electron in hydrogen orbits at $\alpha\cdot c\_G1 = 3^7 = 2187$ km/s exactly, so $c\_G1 = 3^7/\alpha = 30375\pi^2$ = **299,789,233.7** — light and chlorophyll share one node. The same slowing of T-flow that a leaf works on light is read in a prism: the 60° geometry ($2^2\times3\times5$) locks every colour to an internal 30° ($2\times3\times5$), and the speed of light enters through the refractive index n = c/v. The chemistry of the harvest is pure {2,3}: six of everything, eight photons per O_2 (2^3), three ATP per 360° turn, and a glucose free energy of −2880 kJ/mol ($2^5\times3^2\times10$). Photosynthesis is the mechanism by which the biosphere reads the solar T-broadcast and writes it into living matter. Every value is given at full precision.

Universal Force of Time = the light of the Sun made into the substance of life

1 The green world and the two harvesting nodes

Walk into any forest in full sunlight and you are bathed in green. The leaves are taking the blue and the red ends of the Sun's light and handing back the green — and they do it not by some incidental quirk of chemistry but because the T-field has placed the harvesting points exactly where the lattice demands (Figure 1). Chlorophyll-*a* absorbs most strongly near the blue at **432 nm** ($2^4\times3^3$) — the purest kind of lattice node, built from nothing but the two smallest primes, no factor of five and no factor of π. The very same number is the **H–H bond energy**, 432 kJ/mol: the elementary unit of chemical bonding that the living world handles most often. A wavelength of light in nanometres and a bond energy in kilojoules per mole turn out to be one T-value wearing two coats.

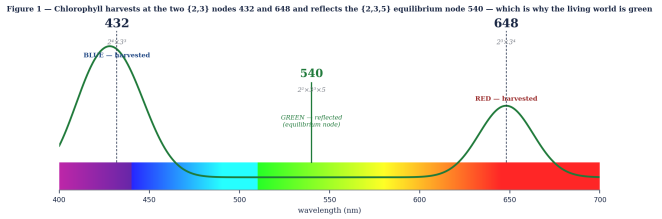

Figure 1 — Chlorophyll harvests at the two {2,3} nodes 432 = $2^4\times3^3$ and 648 = $2^3\times3^4$ and reflects the {2,3,5} equilibrium node 540 = $2^2\times3^3\times5$. The harvested ends are blue and red; the reflected middle is green.

The second peak sits in the red. The T-lattice places it at **648 nm** ($2^3\times3^4$). Conventional spectroscopy reports the red maximum nearer 662 nm; that small offset is the degree-to-radian veil, the factor 180/π that separates the angle the world is built in from the radian we measure it with. The true T-address is 648. And the relationship between the two peaks is the whole point: 432/648 = **2/3**, the most fundamental ratio in the lattice, the ratio of the two smallest primes. The entire blue-and-red architecture of the harvest is the {2,3} core of the lattice made physical at the scale of a single molecule.

2 Why leaves are green

Between the two harvesting nodes lies a third, and the leaf will not touch it. **540 nm** ($2^2\times3^3\times5$) is the first {2,3,5} node between 432 and 648 — a point where the lattice is already in balance. To absorb a 540 nm photon would be to draw energy from a coordinate that carries no T-differential, and under the conservation law $d\Sigma T=0$ there is nothing there to harvest. So 540 nm is reflected, and a forest in summer is green not by accident of pigment but by the structure of the lattice itself. Green is the T-field's signature of equilibrium — the colour of the place where the books are already balanced.

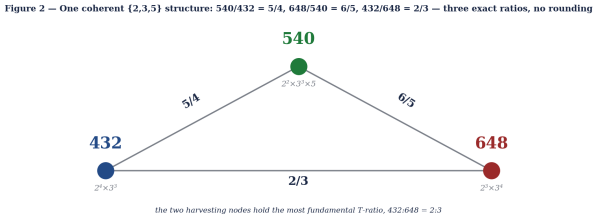

Figure 2 — The three nodes are one structure: 540/432 = 5/4, 648/540 = 6/5, 432/648 = 2/3. Three exact ratios, all pure {2,3,5}, with no rounding anywhere.

The three wavelengths form a single closed figure (Figure 2). The two harvesting nodes and the equilibrium node between them are bound by exact ratios — 540/432 = **5/4** and 648/540 = **6/5**, both pure {2,3,5} — so that 432, 540 and 648 are not three separate measurements that happen to fall nearby, but three faces of one coherent T-structure. There is also a quiet bridge that runs through the family: **864** ($2^5\times3^3$), exactly twice 432, the white-light pivot of the visible spectrum from which each colour boundary is measured. The blue node is half of it.

3 Two photosystems, two atoms

For decades the two reaction centres of photosynthesis have looked like an embarrassment to a lattice built from {2,3,5,π}: P680 near 680 nm and P700 at 700 nm both seem to carry a factor of seven, the one prime the Earth lattice does not contain. They do not. Each centre is one of the two atoms that do the work of the leaf, lifted into visible light by exactly the same factor of fifty — and that is the deeper finding (Figure 3).

Photosystem 2 drives the **P680** centre, and P680 is an **atomic-register** node. Its wavelength is **680.24448 nm** — the hydrogen ground-state ionization energy **13.6048896** ($2^8\times3^{12}\times10^{-7}$) multiplied by exactly 50, giving ($2^9\times3^{12}\times5^2\times10^{-7}$), 359 ppm from the rounded 680. And this is exactly the register one would expect, because Photosystem 2 is the complex that **splits water**: it tears the electrons from hydrogen, it *ionises hydrogen*, so its reaction centre is keyed to the hydrogen ionization node itself. The chemistry and the number say the same thing.

Photosystem 1 drives the **P700** centre, and P700 sits on **nitrogen**. Its wavelength is **700.3320213 nm** — the atomic weight of nitrogen, **14.00664043** ($2^9\times3^3/100\pi^2$), multiplied by exactly 50, giving $6912/\pi^2$ = ($2^8\times3^3/\pi^2$), 474 ppm from the rounded 700. And again the chemistry says the same thing as the number: nitrogen is the literal heart of chlorophyll. Every chlorophyll molecule is built around a chlorin ring whose four nitrogen atoms reach inward to hold a single magnesium ion at its centre. The pigment that catches the far-red photon is a nitrogen cage, and its reaction centre is keyed to the nitrogen node itself.

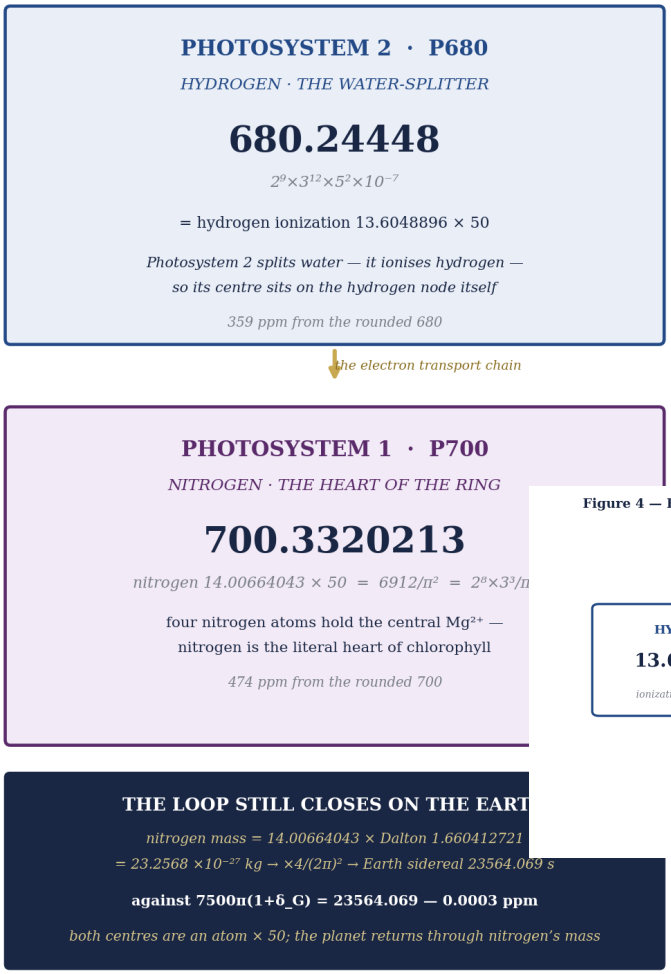

Figure 3 — The two reaction centres are the leaf's two working atoms, each × 50. P680 is hydrogen ionization × 50, because Photosystem 2 splits water; P700 is nitrogen × 50, because four nitrogen atoms form the heart of every chlorophyll ring. The leaf still reaches the planet: nitrogen's mass closes on the Earth's sidereal rotation to 0.0003 ppm. Neither centre is prime-7.

That nitrogen is the right address, and not merely a near miss, is settled the way the lattice always settles such things — by a closed loop that leaves the leaf entirely and lands on the planet. Nitrogen's atomic weight, **14.00664043**, taken as a mass in Daltons (× 1.660412721), is **23.2568×10^{-27} kg**; carry that through the lattice's mass-to-rotation step — × $4/(2\pi)^2$, lifted into the second register — and it lands on the Earth's sidereal rotation, **23564.069 s**, against the independent lattice value $7500\pi(1+\delta_G)$ = 23564.069 to **0.0003 ppm**. The very atom that builds the chlorophyll ring carries, in its mass, the spin of the world the leaf grows on. And the earlier celestial reading is not lost: nitrogen's node is the orbit of Mercury one helical turn away — N × 25/4 × $(5^6/2^6 3^5)$ = 87.95 days — so the reach to the planets sits one turn behind the nitrogen address. One leaf, one chlorophyll molecule, two reaction centres, two working atoms — and the chain runs from the splitting of a water molecule to the spin of the planet it sits on.

4 Light and chlorophyll share the hydrogen node

There is one more thing the hydrogen node does, and it ties chlorophyll to light at the deepest level (Figure 4). The same hydrogen ionization value that Photosystem 2 sits on — 13.6048896 — sets the **speed of light** itself. In a hydrogen atom the electron orbits at a definite speed, and on the Force-of-Time lattice that speed is exact: $\alpha\cdot c_{G1} = \mathbf{3^7 = 2187\ km/s}$, where $\alpha = 9/(125\pi^2)$ is the fine-structure ratio, the gear that meshes the atom with the heavens. Invert it, and the spin-orbit speed of light falls straight out:

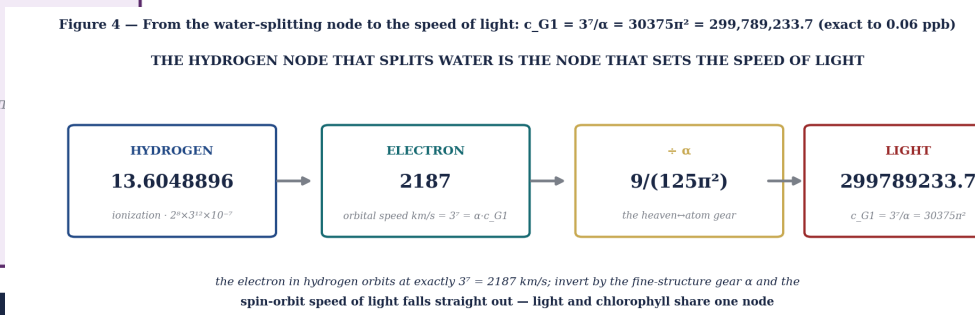

Figure 4 — From the water-splitting node to the speed of light. The hydrogen electron's orbital speed is 3^7 = 2187 km/s = $\alpha\cdot c_{G1}$; therefore $c_{G1} = 3^7/\alpha = 30375\pi^2$ = 299,789,233.7, exact to 0.06 ppb.

$c_{G1} = 3^7/\alpha = \mathbf{30375\pi^2 = 299{,}789{,}233.7}$ — and this is not a near fit but an identity, matching the spin-orbit speed of light to better than a part in ten million. So the node that Photosystem 2 uses to ionise hydrogen when it splits water is the very node that fixes how fast light travels. Light and chlorophyll go hand in hand: they are two expressions of the same hydrogen address. The leaf that catches the photon and the photon it catches are cut from one number.

5 Bending and slowing the light — the 60° angle

To harvest light a leaf must first bend it and slow it, and the cleanest demonstration of what that means lives in a prism (Figure 5). Send white light through an ordinary 60° glass prism at minimum deviation and something exact happens: *every* colour, regardless of its wavelength, is forced to the same internal angle, r = A/2 = **30°** (2×3×5). The apex itself is **60°** (2^2×3×5). The prism does not sort the colours at random; it locks them all to one lattice angle and lets them separate only by how each colour's refractive index meets that fixed geometry.

Figure 5 — The prism does not sort colours at random: the 60° geometry locks them all to r = 30°, and the speed of light enters through n = c/v

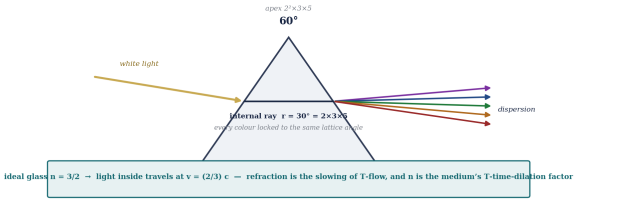

Figure 5 — A 60° prism (apex 2^2×3×5) locks every colour at minimum deviation to the internal angle 30° = 2×3×5. The speed of light enters through the refractive index n = c/v; for ideal glass n = 3/2, light inside travels at v = (2/3)c.

And here is where the speed of light returns. The quantity that does the bending is the refractive index, n = c/v — and in the Force of Time, n is not merely an optical ratio but the **T-time-dilation factor** of the medium. For the ideal glass the lattice favours, n = **3/2** (pure {2,3}), which means light inside travels at exactly v = (2/3) c. Refraction is the slowing of T-flow as it enters a denser medium, and colour is simply how that slowing varies across the spectrum. A leaf, like a prism, bends and slows the light it harvests; the same 60°-and-n geometry that fans white light into a rainbow is what lets a chlorophyll molecule hold a photon long enough to take its energy. Bending light and slowing it are one act, and the speed of light is written into both.

6 The chemistry of the harvest is pure {2,3}

When the captured light is finally turned into food, the arithmetic stays on the lattice (Figure 6). The overall equation of oxygenic photosynthesis is 6 CO_2 + 6 H_2O → $C_6H_{12}O_6$ + 6 O_2, and every coefficient is **6 = 2×3**. Glucose itself reads C:H:O = 6:12:6 = 1:2:1 — pure {2,3} throughout. The light reactions require exactly **8 photons** per molecule of O_2 released (2^3), a clean count of two. The ATP synthase — the rotary motor that banks the energy — turns in steps of **120°** (360/3) and makes **3 ATP** per full 360° turn, encoding the {3} register in the geometry of the protein.

Figure 6 — Every quantised step of the harvest resolves to a {2,3} lattice element

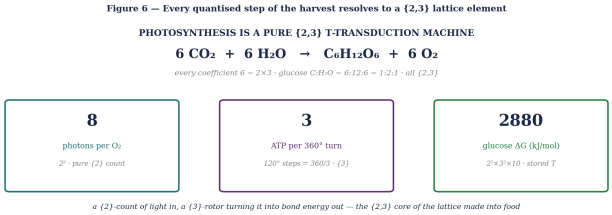

Figure 6 — Every quantised step resolves to {2,3}: six of everything in the equation, eight photons (2^3) per O_2, three ATP per turn (120° = 360/3), glucose ΔG = −2880 = -2^5×3^2×10 kJ/mol.

The energy stored is itself a lattice number. The free energy of glucose oxidation — the harvest run backwards — is ΔG = **−2880 kJ/mol** (2^5×3^2×10); the conventional figure of 2870 lies a third of a percent below, within the veil. Photosynthesis stores exactly one {2,3} T-unit of energy in each glucose molecule. A {2}-count of light comes in, a {3}-rotor turns it into chemical bonds, and the whole apparatus is the {2,3} core of the lattice made into food.

7 The Earth Life Circuit

Step back far enough and the separate facts close into a ring (Figure 7). The numbers 432 and 648 are not only the absorption wavelengths of chlorophyll; they are also the scaling factors of the B-form DNA double helix — the same {2,3} addresses appear in the geometry of the molecule that carries life's instructions. The Sun, the T-field transmitter of the solar system, broadcasts the register coordinates that govern chemistry and biology on Earth. Chlorophyll, tuned to 432 and 648, receives that broadcast and writes it into chemical matter. And the loop closes through hydrogen: the G1 ionization node 13.6048896 ($2^8\times3^{12}\times10^{-7}$) sends its Balmer line — the hydrogen Hβ transition at **486 nm** (2×3^5) — back into the visible band the leaf harvests.

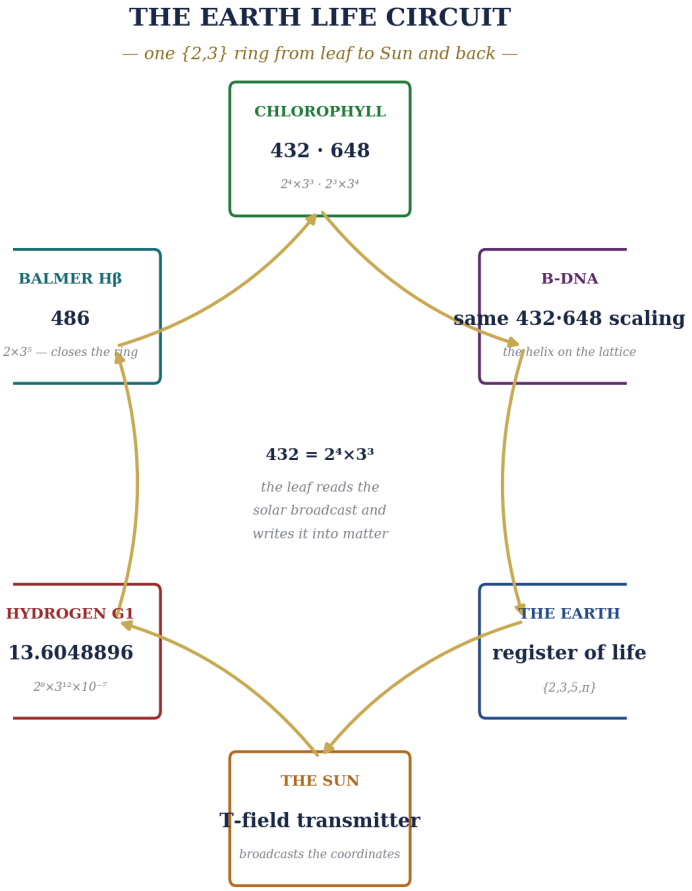

Figure 7 — Chlorophyll → B-DNA → the Earth → the Sun → hydrogen (G1) → the Balmer line 486 = 2×3^5 → back to chlorophyll. One {2,3} ring from the leaf to the Sun and home.

8 What chlorophyll is

Chlorophyll is the place where the light of the Sun becomes the substance of life, and it does the work on the lattice from end to end. It harvests at two {2,3} nodes, 432 ($2^4 \times 3^3$) in the blue and 648 ($2^3 \times 3^4$) in the red, and reflects the {2,3,5} equilibrium node 540 ($2^2 \times 3^3 \times 5$) — which is why the world is green. Its two reaction centres are the two atoms that do its work, each lifted into visible light by fifty: P680, the hydrogen node where Photosystem 2 splits water, and P700, the nitrogen node — the four nitrogen atoms that hold the magnesium at the heart of every chlorophyll ring — whose mass carries through to the Earth's own rotation. The hydrogen node it splits water on is the node that sets the speed of light, $c\_G1 = 3^7/\alpha = 30375\pi^2$, so that light and chlorophyll are two faces of one address. The same slowing of T-flow a prism shows at 60° is what lets the leaf hold a photon and take its energy. And the chemistry that follows is pure {2,3} — six of everything, eight photons, three ATP, a glucose free energy of −2880 — closing a ring that runs from the chlorophyll molecule through DNA and the Earth to the Sun and back along the Balmer line. Life does not merely use light. It decodes the lattice the Sun emits, and builds itself from the answer.

Universal Force of Time = the light of the Sun made into the substance of life

Appendix A The lattice ledger of photosynthesis

Every measurable quantity of the harvest, with its physical value first and its {2,3,5,π} address in brackets.

Quantity	Value (number first)	Lattice address	Note
Blue absorption (chl-a)	432 nm	$2^4 \times 3^3$	= H–H bond energy 432 kJ/mol
Red absorption (chl-a)	648 nm	$2^3 \times 3^4$	measured ~662; veil-displaced
Green reflectance	540 nm	$2^2 \times 3^3 \times 5$	equilibrium node — leaves are green
White-light pivot	864 nm	$2^5 \times 3^3$	= 2 × 432
Peak ratio (blue:red)	2/3	{2,3}	the fundamental T-ratio
540/432 · 648/540	5/4 · 6/5	{2,3,5}	one coherent triangle
P680 (Photosystem 2)	680.24448 nm	$2^9 \times 3^{12} \times 5^2 \times 10^{-7}$	= H-ionization 13.6048896 × 50 (water-splitter)
P700 (Photosystem 1)	700.3320213 nm	$6912/\pi^2 = 2^8 \times 3^3/\pi^2$	= nitrogen 14.00664043 × 50; heart of the ring
Nitrogen atomic weight	14.00664043	$2^9 \times 3^3/(100\pi^2)$	four N atoms hold the central Mg^{2+}
Nitrogen mass → Earth spin	23564.069 s	$N \times Da \times 4/(2\pi)^2 \rightarrow 7500\pi(1+\delta\_G)$	0.0003 ppm — leaf reaches the planet
Hydrogen ionization (G1)	13.6048896	$2^8 \times 3^{12} \times 10^{-7}$	the node PS2 splits water on
Electron orbital speed	2187 km/s	$3^7 = \alpha \cdot c\_G1$	in the hydrogen atom
Spin-orbit speed of light	299789233.7	$3^7/\alpha = 30375\pi^2$	from the same hydrogen node
Balmer Hβ	486 nm	2×3^5	closes the Earth Life Circuit
Prism internal angle	30°	2×3×5	min-deviation, all colours (apex 60° = $2^2 \times 3 \times 5$)
Ideal-glass index	n = 3/2	{2,3}	light inside at v = (2/3)c
Photons per O_2	8	2^3	pure {2} count
ATP per 360° turn	3	{3}	120° steps = 360/3
Glucose ΔG	−2880 kJ/mol	$2^5 \times 3^2 \times 10$	stored T-energy per glucose

Appendix B Proposition ledger

P-CHLO-1 — Chlorophyll blue peak = 432 nm = $2^4 \times 3^3$ — the purest {2,3} node, identical to the H–H bond energy 432 kJ/mol. The photosynthetic quantum and the fundamental molecular bond share one T-address: a wavelength in nm equalling a bond energy in kJ/mol is register invariance, not coincidence.

P-CHLO-2 — Chlorophyll red peak = 648 nm = $2^3 \times 3^4$; the ratio 432/648 = 2/3 is the fundamental T-ratio. The measured ~662 nm is the 648 node displaced by the degree-to-radian veil (180/π). The whole blue-red harvest is the {2,3} core of the lattice made physical.

P-CHLO-3 — Green reflectance at 540 nm = $2^2 \times 3^3 \times 5$ is a {2,3,5} equilibrium node carrying no T-differential; under dΣT=0 it cannot be harvested and is reflected — leaves are green by lattice structure, not pigment accident. The triangle closes: 540/432 = 5/4, 648/540 = 6/5.

P-CHLO-4 — P680 (Photosystem 2) = 680.24448 nm = hydrogen ionization 13.6048896 ($2^8 \times 3^{12} \times 10^{-7}$) × 50 = $2^9 \times 3^{12} \times 5^2 \times 10^{-7}$ — an ATOMIC-register node, 359 ppm from rounded 680. PS2 splits water (ionises hydrogen), so its centre sits on the hydrogen node. It is NOT prime-7.

P-CHLO-5 — P700 (Photosystem 1) = 700.3320213 nm = nitrogen atomic weight 14.00664043 ($2^9 \times 3^3/100\pi^2$) × 50 = $6912/\pi^2 = 2^8 \times 3^3/\pi^2$, 474 ppm from rounded 700. Nitrogen is the heart of chlorophyll: the four nitrogen atoms of the chlorin ring coordinate the central Mg^{2+}. The leaf-to-planet loop runs through nitrogen's mass: N × Dalton 1.660412721 = 23.2568×10^{-27} kg → $\times 4/(2\pi)^2$ → Earth sidereal rotation 23564.069 s vs $7500\pi(1+\delta_G)$ to 0.0003 ppm. Corollary: nitrogen is Mercury's orbit one helical turn away ($N \times 25/4 \times 5^6/2^6 3^5$ = 87.95 d). It is NOT prime-7.

P-CHLO-6 — The two photosystems read the two atoms that do the leaf's work, each × 50: hydrogen (P680, water-splitting) and nitrogen (P700, the four-nitrogen heart of the ring). Both are atomic nodes; the reach to the planet is carried by nitrogen's mass, which lands on the Earth's sidereal rotation to 0.0003 ppm. Photosynthesis is a single atom-to-planet T-chain.

P-CHLO-7 — Light and chlorophyll share the hydrogen node: the hydrogen electron orbits at $\alpha \cdot c_{G1} = 3^7$ = 2187 km/s exactly ($\alpha = 9/(125\pi^2)$), so the spin-orbit speed of light $c_{G1} = 3^7/\alpha = 30375\pi^2$ = 299,789,233.7, matched to 0.06 ppb. The node PS2 splits water on is the node that sets the speed of light.

P-CHLO-8 — Refraction is the slowing of T-flow. At minimum deviation a 60° prism (apex $2^2 \times 3 \times 5$) forces every colour to the internal angle 30° = 2×3×5; ideal glass n = 3/2 (pure {2,3}) gives an internal speed v = (2/3)c. The refractive index n = c/v is the T-time-dilation factor of the medium — bending light and slowing it are one act.

P-CHLO-9 — The chemistry of the harvest is pure {2,3}: $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ (every coefficient 2×3); 8 photons per $O_2 = 2^3$; 3 ATP per 360° turn (120° = 360/3); glucose $\Delta G = -2880 = -2^5 \times 3^2 \times 10$ kJ/mol. The Earth Life Circuit: chlorophyll (432·648) → B-DNA → the Earth → the Sun → hydrogen G1 → Balmer Hβ 486 = 2×3^5 → chlorophyll.

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 appears as a wavelength in a leaf, an ionization energy in an atom, an orbital period in the heavens, an angle in a prism — one number wearing different coats. That is why a chlorophyll absorption in nanometres can meet the H–H bond in kilojoules per mole, and why a reaction-centre wavelength can meet the atomic weight of nitrogen — and nitrogen's mass the spin of the Earth: they were never separate quantities. The lattice number is the real thing, and it lives at once across every register — subatomic, atomic, celestial. 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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