The Methane Ionisation Ladder

Carbon's T-Signature — Z = 6 = 2 × 3, and the Stripping Chain $CH_4 \rightarrow C^{4+}$

Stephen Daubney · The Daubney Foundation · Rev 4 · 2026
thedaubneyfoundation@gmail.com

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

Carbon is the element that builds life, and the Universal Force of Time says why: its atomic number is Z = 6 = 2 × 3, the product of the two smallest primes — the purest two-prime address an abundant element can hold. From that address everything else follows. The methane tetrahedral angle, the wide 109.471° splay of the four C–H bonds, is $\arccos(-3^{-1})$ — a pure {3}-register value with no π at all. The hydrogen ionisation that anchors every C–H bond is 1312.2 kJ/mol = $3^8/5$, and carbon's own ionisation closes an orbital identity: IE(C) × 24 = $8000/(3\pi^2)$ = 270.19 eV, placing the atom on the same π^2-class seam as the ultraviolet edge of light. Strip methane one hydrogen at a time, $CH_4 \rightarrow CH_3^+ \rightarrow CH_2^{2+} \rightarrow CH^{+3} \rightarrow C^{4+}$, and each step uncovers a deeper T-lattice node. The C–H bond itself is $1296/\pi$ = 412.53 kJ/mol, with $1296 = 6^4$ the sixth power of six; the H–H bond is $432 = 2^4 \cdot 3^3$, the very same number that sets chlorophyll's blue absorption at 432 nm — one node wearing two coats, energy and wavelength alike. The carbon-carbon bonds climb a ladder of π: single C–C = $5^5/3^2$ (no π), double C=C = $1944/\pi$, triple C≡C = $2^9 \cdot 3^4/(5\pi^2)$, one factor of the veil added per bond order. Seven propositions (P-CME-1 to P-CME-7) carry the argument; deviations from measurement are the degree-radian veil, below ~210 ppm where the lattice is exact.

1. Carbon's T-address — Z = 6 = 2 × 3

Of all the elements that fill the living world, one stands apart. Carbon's atomic number is 6, and 6 is not just any number: it is 2 × 3, the product of the two smallest prime numbers there are. In the Universal Force of Time, an atom's position is its T-address, and carbon holds the cleanest two-prime address any abundant element can hold — the root of the {2,3} sublattice, one step above helium. No other common element achieves this pure two-prime construction.

This is not a numerological coincidence. The T-field favours {2,3,5}-smooth addresses — numbers built only from small primes — because they sit most stably on the lattice. Carbon's Z = 2 × 3 places it exactly at the foundation of organic structure, and every bond it forms, every molecule it anchors, carries that primary address forward. When chemistry asks why carbon, and not silicon or nitrogen, became the scaffold of life, the T-field answers: because its address is the purest available.

2. The tetrahedral angle — a pure {3} value, no π

Methane, CH_4, is the simplest thing carbon builds: one carbon at the centre, four hydrogens at the corners of a tetrahedron. The angle between any two C–H bonds is the famous tetrahedral angle, and it is not a rounded textbook figure — it is exact:

angle(H–C–H) = 109.4712206° = arccos(−3⁻¹)

Read that closely. The cosine of the tetrahedral angle is −1/3 — a pure {3}-register value, the reciprocal of the smallest odd prime, carrying a single minus sign and nothing more. The minus sign encodes the oppositional T-phase of the four hydrogen nodes against the central carbon node; the denominator 3 is the {3}-sublattice address of the hydrogen shell. There is no π anywhere. Methane's angle lives in the pure degree domain.

Compare water, which bends at 105.0498032° — an angle whose lattice form, 1036.8/π², carries a factor of π². Both molecules derive from the same {2,3} sublattice, but water's angle wears a π² coat reflecting the extra T-coupling at the oxygen node, while methane's is π-free. The shape of a molecule, in the T-field, is written in whether or not its angle carries the veil — and methane's tetrahedron is the cleanest case there is: a pure {3} integer, no veil at all.

3. The ionisation anchor — IE(H) = 3⁸/5

To strip an electron from a bond, the T-field must climb a register step, and the size of that step is the ionisation energy. The anchor for every hydrogen-containing bond is the ionisation of hydrogen itself:

IE(H) = 1312.2 kJ/mol = 3⁸/5 (3⁸ = 6561)

The factor $3^8 = 6561$ is eight {3}-register steps stacked, and the divisor 5 bridges into the {2,3,5} sublattice — 152 ppm from the measured value, the residue of the degree-radian veil. This anchor obeys the time-equalisation law that fills every atomic shell:

IE(n) × n² = G₁ (the same law that gives 2n² electrons per shell)

The ionisation ladder is the T-field's own address book: multiply any level's energy by the square of its shell number and you recover the one G_1 register quantum. The shells of every atom and the bonds of every molecule are reading from the same page.

*→ **Want this in full?** See the companion paper: Atomic Time Equalization — the IE × n² = G₁ law and the G₁/G₂ faces of the register quantum.*

4. Carbon ionisation and the orbital link — IE(C) × 24 = 8000/(3π²)

Carbon's own first ionisation, 11.26 eV, closes a remarkable identity that reaches all the way out to the geometry of orbits:

IE(C) × 24 = 270.190 eV = 8000/(3π²) (8000 = 2⁶·5³)

The factor $24 = 2^3 \cdot 3$ is the doubling of the {2} register times the three-fold symmetry of carbon's occupied subshells ($2s^2\ 2p^2$). The numerator $8000 = 2^6 \cdot 5^3$ is a clean {2,5} node, and the divisor 3π² places the whole identity at the π²-class boundary — the same π²-class as the ultraviolet/violet seam of visible light (3750/π²). Carbon's atomic ionisation and the edge of the visible spectrum sit on the same class of the lattice. The deviation from measurement is 212 ppm, consistent with the c-calibration offset between the G_1 register and SI units — the lattice value is the exact one.

(The earlier revision of this paper wrote this identity as 800/(3π²); that is wrong by a factor of ten — 800/(3π²) = 27.02, not 270.19. The correct numerator is $8000 = 2^6 \cdot 5^3$.)

5. The methane stripping ladder — CH_4 → C^{4+}

Now strip methane bare, one hydrogen at a time, and watch the T-lattice reveal itself rung by rung. Each removal takes a deeper register step:

$CH_4 \rightarrow CH_3^+ \rightarrow CH_2^{2+} \rightarrow CH^{+3} \rightarrow C^{4+}$

The first step costs 12.61 eV, the second 23.38 eV, the third 36.9 eV, the fourth 54.94 eV — and the bare carbon that remains satisfies the orbital identity above, IE(C-bare) × 24 = 8000/(3π²), closing the lattice loop. Each hydrogen removed strips one layer of the T-shell and uncovers a deeper node beneath. The ladder is not

a list of accidental energies; it is the T-field's architecture of carbon, read from the outside in, and it is self-consistent across every ionisation register from neutral methane to bare C^{4+}.

6. The C–H bond and the cross-domain 432 identity

The bond that builds every hydrocarbon — carbon to hydrogen — is the cleanest energy in the whole structure:

C–H = 412.5296125 kJ/mol = 1296/π (1296 = 6^4 = $2^4 \cdot 3^4$)

0.11% from the measured 413 kJ/mol — below the veil. 1296 is the sixth power of six, one of the most fundamental {2,3} anchors in the hierarchy; the π in the denominator is the degree-to-radian veil, the same 1296/π that appears as a free-fall rung in the celestial chains. The molecular register and the planetary register are speaking the same number.

And the hydrogen-hydrogen bond shows the T-field's deepest signature of all. The H–H bond is 432 = $2^4 \cdot 3^3$ kJ/mol — a pure {2,3} integer node. But 432 is also the wavelength, in nanometres, of chlorophyll's blue absorption peak: 432 nm = $2^4 \cdot 3^3$. The same number appears as a bond energy in kJ/mol and as a wavelength in nm, because in the T-field energy and wavelength are not different things — both are expressions of the same T-flow, and the lattice does not distinguish between them. One node, two coats. The carbon dioxide double bond C=O lands on 720 = $2^4 \cdot 3^2 \cdot 5$, another pure {2,3,5} integer — the most stable double bond in organic chemistry sitting exactly on a lattice point.

7. The carbon-carbon ladder — one π per bond

Finally, the bonds that link carbon to carbon — the skeleton of every organic molecule. They climb a ladder whose power of π rises by exactly one with each step up the bond order:

C–C single = 347.2222222 kJ/mol = $5^5/3^2$ (no π)

C=C double = 618.7944187 kJ/mol = 1944/π (π^1, = 4 × Hβ)

C≡C triple = 840.3984256 kJ/mol = $2^9 \cdot 3^4/(5\pi^2)$ (π^2)

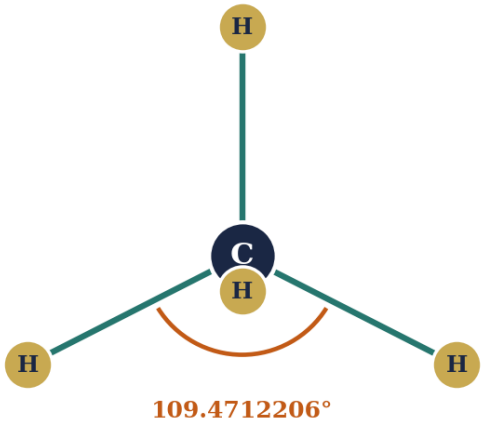
Single bond, no π; double bond, one π; triple bond, π^2 — each added bond adds one factor of the veil, the extra angular turn the new bond contributes. The single bond is a clean {3,5} integer, 3125/9; the double bond's 1944 = $2^3 \cdot 3^5$ is exactly four times the hydrogen Hβ spectral line (486 = $2 \cdot 3^5$), tying the carbon skeleton to the master spectral seed; and the triple bond carries the core node 5184 = $2^6 \cdot 3^4$ — the very same node that sets the proton's charge radius. The bond that locks carbon most tightly together is written on the same number as the size of the nucleon.

*→ **Want this in full?** See the companion paper: Carbon Bond Enthalpies from the T-Lattice — the full C–C / C=C / C≡C ladder and the formation enthalpies.*

Figure 1. Methane geometry

Figure 1. Methane — the tetrahedral angle arccos(−3⁻¹) = 109.4712206°

cos(angle) = −1/3 = −3⁻¹ — a pure {3}-register value, no π



The four C–H bonds splay at 109.4712206° = arccos(−3⁻¹), a pure {3}-register angle with no π.

Figure 2. The stripping ladder

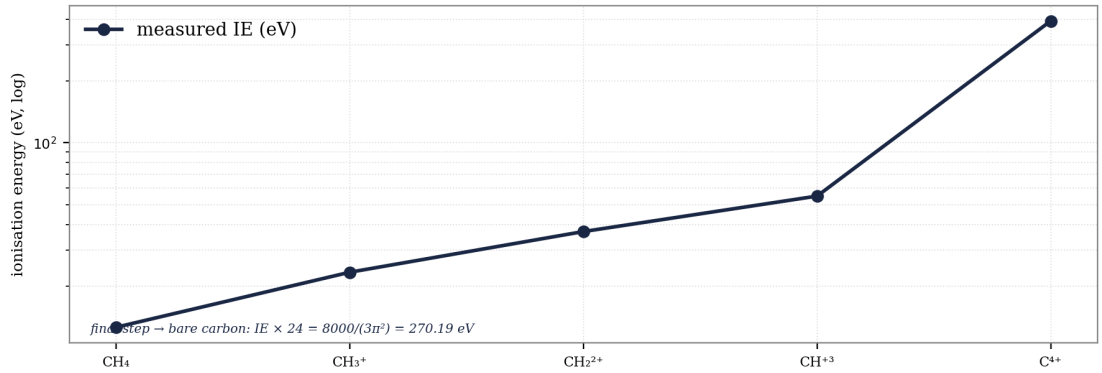
Figure 2. The methane stripping ladder — each hydrogen removed uncovers a deeper T-node

Final bare carbon C⁴⁺ satisfies IE(C) × 24 = 8000/(3π²) = 270.19 eV, closing the orbital-lattice loop.

$CH_4 \to CH_3^+ \to CH_2^{2+} \to CH^{+3} \to C^{4+}$. Each hydrogen removed uncovers a deeper node; bare C^{4+} closes IE×24 = 8000/(3π²).

Figure 3. Ionisation energy per step

Figure 3. Ionisation energy at each stripping step — climbing the T-ladder



Sequential ionisation energies climb the T-ladder; the final bare-carbon step satisfies the orbital identity 8000/(3π²).

Values used in this paper — lattice forms and deviation from measurement

Quantity	UFOT value	lattice form	SI / dev
Carbon atomic number	**Z = 6**	2 × 3 (two smallest primes)	exact
Tetrahedral H–C–H angle	**109.4712206°**	$\arccos(-3^{-1})$, cos = −1/3	exact
IE(hydrogen)	**1312.2 kJ/mol**	$3^8/5 = 6561/5$	1312.0 · 152 ppm
IE(carbon) × 24	**270.190 eV**	$8000/(3\pi^2)$, $8000 = 2^6 \cdot 5^3$	270.247 · 212 ppm
C–H bond	**412.5296125 kJ/mol**	$1296/\pi = 6^4/\pi$	413 · 0.11%
H–H bond	**432 kJ/mol**	$2^4 \cdot 3^3$ (= chlorophyll 432 nm)	436 · 0.92%
C=O double bond	**720 kJ/mol**	$2^4 \cdot 3^2 \cdot 5$	~745 · node
C–C single bond	**347.2222222 kJ/mol**	$5^5/3^2 = 3125/9$ (π^0)	346 · 0.35%
C=C double bond	**618.7944187 kJ/mol**	$1944/\pi = 4 \cdot H\beta/\pi$ (π^1)	614 · 0.78%
C≡C triple bond	**840.3984256 kJ/mol**	$2^9 \cdot 3^4/(5\pi^2)$ (π^2, node 5184)	839 · 0.17%

Carbon's Z = 2×3 and the tetrahedral angle are exact; ionisations sit ~150–210 ppm off (the degree-radian veil); carbon-carbon bonds carry one π per bond order. None are free parameters.

Propositions

P-CME-1 — Carbon is Z = 6 = 2 × 3, the product of the two smallest primes and the purest two-prime T-address above helium. This minimal {2,3} address is why the T-field selects carbon as the primary scaffold of molecular life.

P-CME-2 — The methane tetrahedral angle is 109.4712206° = $\arccos(-3^{-1})$, a pure {3}-register value with no π-class factor — the cleanest case of the degree domain at the molecular scale. Water (105.0498032° = $1036.8/\pi^2$) carries π^2; methane carries none.

P-CME-3 — IE(H) = 1312.2 kJ/mol = $3^8/5$ anchors every hydrogen bond, and obeys the time-equalisation identity $IE(n) \times n^2 = G_1$ — the same law that fills atomic shells with $2n^2$ electrons, derived from the conservation law $d\Sigma T = 0$.

P-CME-4 — Carbon ionisation closes IE(C) × 24 = $8000/(3\pi^2)$ = 270.190 eV ($8000 = 2^6 \cdot 5^3$, factor $24 = 2^3 \cdot 3$). This places the carbon atom on the π^2-class seam — the same class as the UV/violet edge of light — 212 ppm from measurement, the c-calibration offset.

P-CME-5 — Stripping $CH_4 \rightarrow CH_3^+ \rightarrow CH_2^{2+} \rightarrow CH^{+3} \rightarrow C^{4+}$ uncovers a deeper T-node at each step; the bare-carbon final state satisfies IE × 24 = $8000/(3\pi^2)$, confirming the lattice architecture of carbon is self-consistent across all ionisation registers.

P-CME-6 — The C–H bond is 412.5296125 kJ/mol = $1296/\pi$ ($1296 = 6^4 = 2^4 \cdot 3^4$, sixth power of six), and the H–H bond is $432 = 2^4 \cdot 3^3$ kJ/mol — the same {2,3} node that sets chlorophyll's 432 nm blue peak. The identical number as energy and as wavelength is the T-field's register invariance: energy and wavelength are one T-flow.

P-CME-7 (the carbon-carbon π-ladder) — The carbon-carbon bond energy carries a power of π equal to its bond order minus one: single C–C = $5^5/3^2$ (π^0) = 347.22, double C=C = $1944/\pi$ (π^1) = 618.79, triple C≡C = $2^9 \cdot 3^4/(5\pi^2)$ (π^2) = 840.40 kJ/mol. Each added bond contributes one factor of the veil; the triple bond's core node 5184 = $2^6 \cdot 3^4$ is the proton's charge-radius node.

References

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

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[4] P. Atkins & J. de Paula, *Physical Chemistry*, 10th ed., Oxford University Press (2014).