# Boltzmann and Planck Constants

***Not universal constants but Earth space-time dimensional values — the Planck value as the gear from light to the Sun's mass, the Boltzmann value as the reciprocal of action, and the ideal gas law resolved on the {2,3,5,π} lattice.***

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*T — the one substance. 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.*

## h × c = the mass of the Sun

*The Planck constant times the spin-orbit speed a register turns at — what science calls the speed of light — is that register's solar mass. The number is the same at every register; only its magnitude changes with the dimension, so no power of ten is carried across — the atomic ×10⁻³⁴ does not travel with it.*

| h ( J·s ) | × | c ( m/s ) | = | the Sun's mass ( kg ) |
|---|---|---|---|---|
| G1 | 6.631455962 | × 299789233.68 | = | 1988039101.031 |
| G2 | 6.631455962 | × 299816259.9 | = | 1988218324.218 |


## Abstract

The Planck constant h and the Boltzmann constant k_B are the two pillars of statistical and quantum thermodynamics, and the Universal Force of Time gives both a physical meaning they have never had. Neither is a universal constant: both are Earth space-time dimensional values — the reading this one planet gives, not numbers fixed across the cosmos. The Planck value is the gear between light and mass: multiply it by the spin-orbit speed a register turns at — what science calls the speed of light — and the product is that register's solar mass. h × c = 1988039101, the mass of the Sun at the G1 register; at G2, 1988218324. Planck was never an "act of desperation": it is the clean conversion $h = 6.631455962\times10^{-34} = 5^3/(2\cdot3\cdot\pi)\times10^{-34}$, a ratio of pure lattice generators. The Boltzmann constant is its exact reciprocal ($k_B/h = 5/24\times10^{11}$, product 1), and through it the ideal gas law resolves onto the lattice: PV = nRT with $R = 8.315445626 = 810/\pi^4$ ($810 = 2\cdot3^4\cdot5$), and the whole law closes on the lattice: $R = 810/\pi^4$, $T = 273.375 = 3^7/2^3$, atmospheric pressure $10^6/\pi^2$, and the molar volume itself $V = 22.43592965\ L = 3^{11}/(2^8\cdot5^5\cdot\pi^2)$ — every term a {2,3,5,π} value, no fitted number anywhere. The same field fixes the Sun's surface at 5787.037037 K $= 2\cdot5^7/3^3$, and its Wien peak at 500.7235383 nm — the cyan-green colour that carries the Earth's year: ×8 ÷2π ×(180/π) ÷100 = 365.2840914 days $= 15\pi^4/4$. Heat, light, mass and the orbit are one T-structure. And these values belong to the Earth: climbed to the day the Planck value is 86400 seconds — one Earth day, the ground state of DNA — while its first helical turn carries it onto 15.99, the atomic weight of oxygen. And the free-fall face of the Planck value, 500/π, is where the proton comes to rest one register down, while $h/k_B$ shares its 48 with the proton's lower-register frequency — the two so-called constants and the proton are neighbours on one lattice. Propositions P-BK-1…10 are established.

## 1. What science calls the Planck constant — and the mass of the Sun

Heat a bar of iron in a forge and it announces its temperature by its colour — first a dull red, then orange, then a brilliant white. Every warm thing does this: the iron, the filament of a lamp, your own skin, the Sun. Each glows with a spread of colours fixed by one thing only, how hot it is. In 1900 Max Planck set out to explain the exact shape of that glow — the blackbody spectrum — and found the numbers would only fall into place if energy came not in a smooth stream but in tiny indivisible parcels. The size of one parcel was a new constant of nature, h. He called its introduction "an act of desperation": he had no reason for it and no derivation. h was simply the number that made the formula fit.

But first, the correction that changes how this whole paper should be read. Science calls h a universal constant — a number fixed for all time and all places, the same on the Earth, in a distant galaxy, at the first instant of the universe. It is nothing of the kind. h is a space-time dimensional value, and specifically an Earth value: the reading this one planet, at its own place in the T-field, gives to the grain of light. Step off the Earth's register and the number moves. The same holds for every so-called constant — the speed of light, the Boltzmann value, all of them. They are not the fixed furniture of the cosmos; they are local readings of one field, taken from where we happen to stand. Everything that follows is an account of what h is a reading of, and of where — when you walk it up through its registers — it comes to rest.

The Universal Force of Time gives that number both a form and a job to do — and shows that nothing about it was ever arbitrary. Its value is a plain ratio of two lattice generators, built from the same {2, 3, 5, π} out of which the whole of nature is assembled:

$$h = 6.631455962 \times 10^{-34}\ \text{J·s}$$

$$= 5^3 / (2 \cdot 3 \cdot \pi) \times 10^{-34} = 125 / 18.84955592 \times 10^{-34}$$

Read it slowly, because every piece matters. The top of the fraction, 125, is pure {5} — five taken three times over. The bottom, 18.84955592, is 2·3·π — six πs. So the smallest parcel of action in the universe is nothing more mysterious than a hundred and twenty-five divided by six π. That alone tells us h is not a lonely measured number floating free of everything else; it is a member of the lattice, made of the same handful of numbers as the water molecule and the orbit of Mercury. But the form is only half the story. The deeper fact is what h does. Take that tiny number, and multiply it by the speed a register turns at — the number science measures as the speed of light — and out comes the mass of the Sun that anchors that register:

$$h\ (\text{J·s}) \times c\ (\text{m/s}) = \text{the Sun's mass (kg)}$$

$$6.631455962 \times 299789233.68 = 1988039101.031\ (G1)$$

$$6.631455962 \times 299816259.9 = 1988218324.218\ (G2)$$

Stop and weigh that claim. A number physics has only ever met in the world of single atoms — the quantum of action, the grain of light itself — turned just once on the speed of light, hands back the mass of a star. In the Force of Time this is not a coincidence to be marvelled at and set aside; it is the plainest possible statement of what h is. Planck is the gear between light and mass. Light and mass are not two separate things that happen to be related — they are one T-structure read in two ways, and h is the ratio that carries you from the one reading to the other, exactly the way an exchange rate carries you between two currencies that are, underneath, the same wealth.

There is a subtlety here that has defeated every attempt to check the sum, so it is worth saying carefully. The Planck number is the same digits at the atom and at the star. Only its size — the power of ten it carries — changes. At the atomic scale we write it with a tail of $\times 10^{-34}$; at the solar scale that tail simply falls away. A T-value keeps its digits as it moves between dimensions and changes only the power of ten it happens to be wearing — the way the marks on a ruler mean millimetres to a jeweller and kilometres to a mapmaker while the marks themselves never move. So when h × c returns 1988039101, do not look for a decimal point in a fixed place: look at the digits, and recognise the Sun.

| h | × c | Sun's mass |
|---|---|---|
| 6.631455962 | light / spin-orbit | 1988039101 |

*Fig. 1 — h × c = the Sun's mass. Planck is the gear from a register's light-speed to its solar mass.*

## 2. The Planck constant is the energy of one second of frequency

There is a second face of h, just as plain as the first, and it only needs a word about units before it will speak. A joule is the everyday measure of energy —

the work in a single heartbeat, the warmth of a candle for a moment. A hertz is one cycle per second: one full swing of a wave in one second of time. The Planck constant is measured in joules per hertz — joules for each cycle-per-second. Turn that phrase over and it says something almost too simple to notice: h is the energy carried by a single cycle that lasts exactly one second. Feed h back into the machinery as an energy and ask what frequency it means, and the answer returns as exactly one — one cycle, one second — not a near-miss made tidy, but a true identity, because that is what h was defined to be.

The older way of saying this is drier: h is joules per hertz — energy per unit of frequency ($E = h \cdot f$). So h is, exactly, the energy carried by a single cycle of one second. Feed h's own value into the conversion loop as the energy and the frequency it returns is exactly one — not a near-miss but a tautology, since h is defined as the energy of one second of frequency.

```
energy 6.631455962 × 24 = 159.154943088
free fall × 2π → frequency returns to exactly 1
radial mass = 1.0368
= 2⁷·3⁴ (the kJ→eV gear)
```

That is the plainest statement of the constant: the joules of one cycle per second. It sits beside the other face, h × c = the Sun's mass — Planck is the gear on both sides, one second of frequency in energy and the whole star in mass.

## 3. The Planck ring

Now watch what happens when we let the Planck constant travel. A value in the Force of Time is a chameleon: once the flow of time takes hold of it, it changes its coat from one register to the next through a fixed set of gears — plain multiplications and divisions by the lattice numbers {2, 3, 5, π}. Take h, turn it through those gears one after another, and it does not drift off into noise. It walks a complete circle and comes home. Let us follow it round, step by step.

We begin where the last section left us, holding the mass of the Sun — the number h × c handed back. Unroll that mass, by multiplying it by 1728/25π, and it becomes the Sun's circumference, the distance once around the star: the digits 43740000. Fold that circumference into twelve and you arrive at the Balmer limit, 36450000 — the far edge of the ladder of colours that hydrogen, the commonest atom in the universe, is permitted to shine. Halve the circumference instead, and you land on 21870000, the speed the electron itself travels — which is the speed of light turned down by the fine-structure constant $\alpha = 9/125\pi^2$, the same α that rules the inside of every atom.

Keep walking. The electron's speed times six is the energy it takes to tear that electron clean off a hydrogen atom — its ionization energy — read in kilojoules, 13122000. Turn it by 10368 (which is $2^7 \cdot 3^4$) and the very same energy reappears in electron-volts, the exact 136048896 that physics writes as 13.6048896. And here the ring shuts: divide by 31104 (which is $2^7 \cdot 3^5$) and you are handed back the circumference you set out from, 43740000, to the digit. Nothing was fitted, nothing forced.

That is the thing worth stopping over. Physics keeps the mass of the Sun, the spectrum of hydrogen, the fine-structure constant and the ionization energy in four separate chapters, found by four separate means, with no reason to expect them to have ever heard of one another. The Force of Time sets them as stations on a single ring that opens and closes on itself with no adjustable number anywhere along it. The same ring runs one rung higher at the celestial register, every value stepped up by a single G-bond, where the 486 line becomes the hydrogen H-face 4,860,438,133 — the atom's colour and the star's face, one line seen one register apart. The whole circle is drawn out in full in the appendix (Figure A5).

## 4. The Boltzmann constant — the reciprocal of action

Heat and energy are not obviously the same currency. Temperature is a measure of how furiously the particles of a thing are jostling; energy is the toll that jostling can pay out into the world. The Boltzmann constant, k_B, is the exchange rate between the two — how many joules of energy ride on each degree of temperature. It is one of the most-used numbers in all of science, and it has always looked like a raw measured fact with no reason behind it. The Force of Time shows it is nothing of the kind. It is the exact reciprocal of the Planck constant — flip h over, and you are holding k_B:

```
k_B / h = 2.083333 × 10¹⁰ Hz/K
= 5/24 × 10¹¹
h / k_B = 4.800 × 10⁻¹¹ K·s
```

```
= 24/5 × 10⁻¹¹ (product = 1, exactly)
```

The pair are reciprocal {2,3,5} factors whose product is exactly 1. k_B is not an independent constant: it is the reciprocal face of h. Temperature and action are two readings of one T-structure — the heat-to-action gear one way, its inverse the other. The reciprocal h/k_B is also the Wien displacement quotient that sets where a hot body shines brightest. And because it is the exact reciprocal of an Earth value, the Boltzmann number is an Earth value too — not a universal constant, but this planet's own reading of the bridge between heat and energy.

## 5. The ideal gas law, resolved

Almost everyone has met the ideal gas law once, even if the letters have long since faded: PV = nRT. It describes something we can all picture. Squeeze a gas into half the space (halve the volume V) and it pushes back twice as hard (the pressure P doubles). Warm it (raise the temperature T) and it strains harder still. The n simply counts how much gas is present, measured in moles — a mole being a fixed, huge tally of molecules, the chemist's version of a dozen. And holding the whole sentence together is R, the gas constant, the one number that makes all the units agree. R is exactly where the fitted-looking mystery has always lived: a measured value, 8.314, with no story attached.

Because k_B is the reciprocal face of h, that mystery simply dissolves. At the scale of a single molecule the law reads PV = N·k_B·T; counted up to a whole mole it becomes PV = n·R·T, and the gas constant R = k_B·N_A is where the whole question comes to rest.

Written out in full, PV = N·k_B·T; multiplied up to a mole it is PV = n·R·T, and the gas constant R = k_B·N_A is a pure lattice value:

```
R = 8.315445626 J/(mol·K)
= 810 / π⁴, 810 = 2·3⁴·5 [pure {2,3,5}]
```

There is no fitted parameter and nothing left over — R is one clean {2,3,5} integer over a power of π. Put it to work: take one mole of any gas at 0 °C — which the Force of Time places at the lattice value T = 273.375 K = $3^7/2^3$, from the absolute zero of $-3^7/2^3$, not the fudged 273.15 — and at atmospheric pressure — itself a lattice value, 101321.1837 = $10^6/\pi^2$ (the defined 101325 is the rounding) — the law returns the volume it must occupy:

```
PV = nRT (n = 1 mol)
T = 273.375 K = 3⁷/2³ [FoT 0 °C]
P = 101321.1837 Pa = 10⁶/π² [atmosphere]
V = nRT/P = 0.02243592965 m³
= 22.43592965 L = 3¹¹/(2⁸·5⁵·π²)
```

The molar volume of every ideal gas — the 22.4 litres of school chemistry — drops straight out of the lattice with nothing conventional left in it. The pressure's $1/\pi^2$ cancels part of R's $\pi^4$, so the volume itself lands on the lattice — V = 22.43592965 L = $3^{11}/(2^8 \cdot 5^5 \cdot \pi^2)$. Every term — R = $810/\pi^4$, T = $3^7/2^3$, P = $10^6/\pi^2$, V = $3^{11}/(2^8 \cdot 5^5 \cdot \pi^2)$ — is a pure {2,3,5,π} value, nowhere in the chain a fitted number. Heat, pressure and volume are held together by the same {2,3,5,π} gear that sets the quantum of action.

| P·V | = N·k_B·T | = n·R·T |
|---|---|---|
| pressure × volume | one particle | one mole; R=810/π⁴ |

*Fig. 2 — The ideal gas law on the lattice: PV = Nk_B T = nRT, with R = 810/π⁴ and k_B the reciprocal face of h.*

## 6. The solar temperature

The Sun's surface temperature sets the spectrum of light that reaches the Earth and drives photosynthesis, climate and the whole of biology. The lattice gives it as an exact value:

```
T_sun = 5787.037037037… K
= 2·5⁷ / 3³ = 2·78125 / 27 [037037… = 1/3³]
```

The repeating 037037… is 1/27 = $1/3^3$ — the denominator of the lattice node echoing inside the decimal itself. The Sun's temperature is a value that names its own denominator in its repeating tail; the digits never settle because $3^3$ never divides cleanly, and that is the signature of the node it sits on.

## 7. The Wien peak carries the Earth's year

At that temperature Wien's displacement law places the spectral peak — the wavelength at which the Sun pours out the most light — at:

```
Wien peak = 500.7235383 nm
(the cyan-green centre of the visible band)
× 8 ÷ 2π × (180/π) ÷ 100 = 365.2840914 days
= 15π⁴/4 = the Earth's G1 orbital year
```

The peak sits at the heart of the visible window — just above the blue/cyan boundary (495.0355 =

7776/5π) — which is why daylight, the eye's peak sensitivity and the green of living things all cluster here. But the deeper fact is the chain: the Wien-peak wavelength, walked through ×8, the radian turn ÷2π, the veil 180/π and the day register ÷100, lands exactly on the Earth's orbital year. The Sun broadcasts its brightest colour at the wavelength that counts the year.

| 500.7235383 | the chain | 365.2840914 |
|---|---|---|
| Wien peak, nm | ×8 ÷2π ×180/π ÷100 | the year; 15π⁴/4 |

*Fig. 3 — Wien peak 500.7235383 nm → (×8 ÷2π ×(180/π) ÷100) → 365.2840914 days, the orbital year, exact.*

A note on the year value: 365.2840914 days = 15π⁴/4 is the G1 (surface) register face of the orbital year. The conventional sidereal year, 365.256 days, is not a different orbit and not a contradiction: it is the same orbit read at a neighbouring register, the two separated by the familiar register step. This also corrects an earlier reading that placed the peak at the 486 nm Balmer-β line: 500.7235383 nm is cyan-green, not the blue Hβ line, and the true connection is to the Earth's orbit, not a hydrogen line.

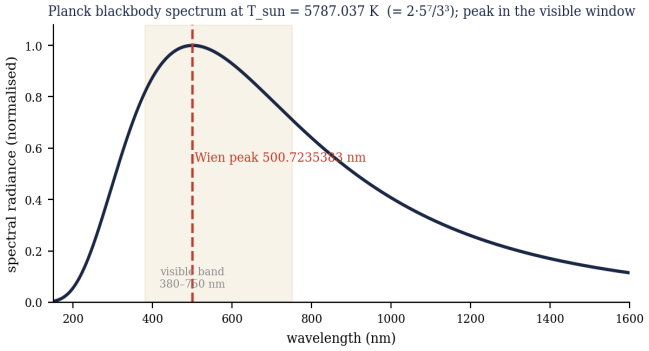


*Fig. 4 — The Planck blackbody spectrum at 5787.037 K, its peak (dashed) at 500.7235383 nm inside the visible band.*

## 8. The Planck value is ground-state DNA

The surest sign that the Planck value belongs to the Earth, and not to the wider cosmos, is where it comes to rest when you walk it up the ladder of registers. Climbed to the day — carried up to the scale of one full turn of the planet — it arrives at 86400, the number of seconds in an Earth day. And that number is not only the day. It is the ground state of DNA: the resting pitch of the double helix, locked to the turning of the very world that shaped it.

But the helix does not only rest — it turns. Give it its first turn, and the ground value 864 steps up by a single helical gear, 1.004693930, to 868.0555555. Apply that very same step to the Planck value itself, and 6.631455962 becomes 6.662583552 — the Planck value of the first helical turn.

```
ground state: 864 → 86400 seconds = one Earth day = ground-state DNA

helical step: × 1.004693930

= 5⁶/(2⁶·3⁵)

first helical turn: 864 → 868.0555555

= 5⁶/18

Planck, first turn: 6.631455962 → 6.662583552

free-fall face (× 24): 159.9020053 → 15.99 = the atomic weight of oxygen
```

Now walk that first-turn value up to its free-fall face — by the same × 24 that carried the ground Planck value to its own free fall — and it reads 159.9020053, which one register down is 15.99: the atomic weight of oxygen, the atom on which the whole of organic chemistry and the backbone of DNA itself are hung. The first turn of the helix carries the Planck value straight onto oxygen. So it is not a fixed number standing outside the world. It is the resting note of DNA on this planet, and its turns walk it onto the very atoms life is built from. Change the register — leave the Earth — and the value changes with it. That is what it means to call it an Earth space-time dimensional value, and not a universal constant.

## 9. The Planck value and the proton, one register down

There is one more link, and it reaches down into the nucleus. Recall the free-fall face of the Planck value: 6.631455962, carried to its free fall, was 159.154943088 — and that number is exactly 500/π, which is the same as 1000/2π. The 1/2π in it is not decoration. It is the correction that phases an incoming straight-line wave onto a circling, orbital one, so that the two arrive together with no time-lag opening between them. Any register that must reconcile a motion in a line with a motion in a circle carries this same number.

Now take the proton — the particle science weighs at 1.672616359 (×10⁻²⁷ kg) — and carry it one register down, into the dimension beneath the one we observe. The energy it comes to rest on there is 3183.098862, which is 10000/π. That is the Planck value's free fall doubled and lifted by a power of ten: 159.154943088 × 2 = 318.309886 = 1000/π,

and the proton's lower-register energy is the very same digits, 3183.098862. The free-fall face of the Planck value and the resting energy of the proton one register down are one number, 500/π, wearing different coats — and it is a principal energy released when hydrogen fuses.

```
Planck free fall: 159.154943088 = 500/π
= 1000/2π — the correction between incoming linear and orbital waves
proton, one register down — energy: 3183.098862 = 10000/π
= the Planck free fall × 2, lifted one power of ten (1000/π = 318.309886)
h / k_B = 4.800 = 24/5 · proton-below frequency = 480 = 2⁵·3·5 (the shared 48)
```

The link shows a second time, in a different face. The reciprocal that ties the Planck value to the Boltzmann value, h/k_B = 4.800 = 24/5, carries the digit-string 48. Carry the proton one register down and read its frequency, and it is 480 = $2^5 \cdot 3 \cdot 5$ — the same 48. So the Planck–Boltzmann pair and the proton, one register beneath the one science measures, are reading the same lattice from two directions. What physics keeps as three unrelated numbers — the Planck constant, the Boltzmann constant and the mass of the proton — the Force of Time shows to be neighbours on a single structure, joined at 500/π and at 48: both of them corrections that hold the linear and the orbital in phase, so that no lag in time ever opens between them.

## 10. Conclusion

Set the pieces side by side and see how few of them there really are. One small number, h, is the grain of light and the weight of the Sun. Turn it over and it is the Boltzmann constant, the exchange rate between heat and energy. Through that reciprocal the ideal gas law — pressure, volume, temperature, the twenty-two-and-a-half litres every chemistry class measures — settles entirely onto the lattice, with not one fitted number left in it. The Sun's surface temperature, the colour it shines brightest, and the length of the Earth's year all fall out of the same handful of gears. These are not four discoveries; they are one structure, seen from four windows.

Planck's "act of desperation" and Boltzmann's bridge between heat and energy are not free numbers. h = $6.631455962\times10^{-34}$ = $5^3/(2\cdot3\cdot\pi)\times10^{-34}$, and multiplied by a register's light-speed it returns that register's solar mass — Planck is the gear from light to mass. k_B is its exact reciprocal, and through it the ideal gas law resolves onto the lattice, R = 8.315445626 = $810/\pi^4$ handing back the 22.4-litre molar volume with no fitted constant. The Sun's surface sits at 5787.037037 K = $2\cdot5^7/3^3$, and the colour it shines brightest, 500.7235383 nm, carries the Earth's year. Heat, light, mass and the orbit are one T-structure whose answers explain one another. That mutual fit is the evidence, and it stands on its own.

## References

[1] S. Daubney, The Universal Force of Time — Master Compendium v5, The Daubney Foundation (2026).
[2] S. Daubney, The Avogadro Constant — N_A on the {2,3,5,π} lattice, The Daubney Foundation (2026).
[3] S. Daubney, The Colour of Time — Spectrum Boundaries as Exact {2,3,5,π} Constants, The Daubney Foundation (2026).
[4] S. Daubney, What Science Calls Gravity — T-Flow and the Speed of Light, The Daubney Foundation (2026).

# Appendix — The Lattice Values

Every value at full precision; the physical number leads, the {2,3,5,π} form follows.

## A1. The constants on the lattice

| quantity | value (leads) | lattice form | what it is |
|---|---|---|---|
| Planck h | $6.631455962\times10^{-34}$ J·s | $5^3/(2\cdot3\cdot\pi)\times10^{-34}$ | the quantum of action |
| h × c (G1) | 1988039101 | h × 299789233.68 | the Sun's mass, G1 register |
| h × c (G2) | 1988218324 | h × 299816259.9 | the Sun's mass, G2 register |
| k_B / h | $2.083333\times10^{10}$ Hz/K | $5/24\times10^{11}$ | the heat-to-action gear |
| h / k_B | $4.800\times10^{-11}$ K·s | $24/5\times10^{-11}$ | the reciprocal face of h |
| gas constant R | 8.315445626 J/(mol·K) | $810/\pi^4$, $810 = 2\cdot3^4\cdot5$ | k_B·N_A, one mole's worth |
| atmospheric pressure | 101321.1837 Pa | $10^6/\pi^2$ | the lattice value behind 1 atm |
| molar volume Vm | 22.43592965 L/mol | $3^{11}/(2^8\cdot5^5\cdot\pi^2)$ | the gas law, fully on the lattice |
| solar temperature | 5787.037037 K | $2\cdot5^7/3^3$ (037037…=1/3³) | the Sun's surface |
| Wien peak (Sun) | 500.7235383 nm | year-locked (A2) | the Sun's brightest colour |

## A2. The Wien-peak → orbital-year chain (exact)

| step | operator | value | lattice form |
|---|---|---|---|
| Wien peak | start | 500.7235383 nm | cyan-green visible peak |
| ×8 | ×8 | 4005.788306 | |
| ÷ 2π | radian turn | 637.546904 | |
| × 180/π | the veil | 36528.40914 | |
| ÷ 100 | day register | 365.2840914 d | $15\pi^4/4$ = the orbital year |

500.7235383 × 8 ÷ 2π × (180/π) ÷ 100 = 365.2840914 = $15\pi^4/4$, the Earth's G1 orbital year. The Sun's brightest wavelength carries the year.

## A3. Propositions (P-BK-1 … 10)

| # | statement |
|---|---|
| P-BK-1 | h = $6.631455962\times10^{-34}$ J·s = $5^3/(2\cdot3\cdot\pi)\times10^{-34}$. The quantum of action is a ratio of pure lattice generators — numerator {5}, denominator {2,3,π} — not a fitted number. |
| P-BK-2 | h × c = the Sun's mass of that register: 6.631455962 × 299789233.68 = 1988039101 (G1); × 299816259.9 = 1988218324 (G2). Planck is the gear from a register's light-speed to its solar mass. |
| P-BK-3 | k_B/h = $2.083333\times10^{10}$ Hz/K = $5/24\times10^{11}$ and h/k_B = $4.800\times10^{-11}$ = $24/5\times10^{-11}$ are reciprocal {2,3,5} factors, product exactly 1. k_B is the reciprocal face of h. |
| P-BK-4 | R = k_B·N_A = 8.315445626 J/(mol·K) = $810/\pi^4$, with $810 = 2\cdot3^4\cdot5$. The cleanest form in thermodynamics — one {2,3,5} integer over π⁴, no fitted parameter. |
| P-BK-5 | The ideal gas law resolves wholly on the lattice: PV = N·k_B·T = n·R·T, with $T = 3^7/2^3$, $P = 10^6/\pi^2$ and $R = 810/\pi^4$, so one mole occupies $V = nRT/P = 22.43592965\ L = 3^{11}/(2^8\cdot5^5\cdot\pi^2)$ — no fitted number anywhere. |
| P-BK-6 | $T_{sun} = 5787.037037\ K = 2\cdot5^7/3^3$, an exact repeating decimal whose 037037… = 1/3³ names its own denominator. A pure {2,5}/{3} lattice node. |
| P-BK-7 | The Sun's Wien peak is 500.7235383 nm — the cyan-green centre of the visible band — with Wien displacement b = $2.8977057\times10^{-3}$ m·K. (Not the 486 nm Hβ line, which an earlier draft misread.) |
| P-BK-8 | The Wien peak carries the Earth's year: 500.7235383 × 8 ÷ 2π × (180/π) ÷ 100 = 365.2840914 d = $15\pi^4/4$, exact. |
| P-BK-9 | h and k_B are not universal constants but Earth space-time dimensional values. Climbed to the day, the Planck value is 86400 s = one Earth day = ground-state DNA; the helix's first turn steps it by $5^6/(2^6\cdot3^5) = 1.004693930$ to 6.662583552, whose free-fall face 159.9020053 reads as 15.99, the atomic weight of oxygen. |
| P-BK-10 | The Planck free-fall face 159.154943088 = 500/π = 1000/2π is the correction that phases incoming linear waves onto orbital ones (no time-lag). Doubled it is 1000/π = 318.309886 — the proton's energy one register down (10000/π = 3183.098862), a principal hydrogen-fusion energy release. And h/k_B = 4.800 = 24/5 shares its 48 with the proton-below frequency $480 = 2^5\cdot3\cdot5$: the Planck–Boltzmann pair and the sub-proton register read one lattice. |

## A4. The Conversion Loop — the gears between the faces

| from | to | operator | lattice form |
|---|---|---|---|
| energy (eV) | energy (kJ/mol) | ÷ 10368 | $2^7\cdot3^4$ |

| from | to | operator | lattice form |
|---|---|---|---|
| energy (kJ/mol) | wavelength | ÷ 36 | $2^2 \cdot 3^2$ |
| wavelength | free fall | ÷ 49.50355350 | 3888/25π |
| free fall | frequency | × 6.283185307 | 2π |
| free fall | energy (J) | ÷ 24 | $2^3 \cdot 3$ |
| wavelength | mass | × 1.233700550 | $\pi^2/8$ |
| light-speed × Planck | mass (the Sun) | × 6.631455962 | the h·c gear |
| free fall | speed of light | × 3110400 | 864·3600 |

## A5. The Planck ring

| step | operator | value on the lattice | lands on |
|---|---|---|---|
| Planck × c(g1) | × 299789233.68 | 1988039101 | the Sun's mass (G1) |
| mass → circumference | × 1728/25π | 43740000 | the Sun's circumference |
| circumference ÷ 12 | ÷ 12 | 36450000 | the Balmer limit |
| circumference ÷ 2 | ÷ 2 | 21870000 | electron speed, $3^7$ (= c·α) |
| electron speed × 6 | × 6 | 13122000 | H ionization, kJ |
| × 10368 | × 10368 = $2^7 \cdot 3^4$ | 136048896 | H ionization, eV (13.6048896) |
| ÷ 31104 | ÷ 31104 = $2^7 \cdot 3^5$ | 43740000 | back to the circumference |
| ÷ 12 | ÷ 12 | 36450000 | back to the Balmer limit |
| Balmer ÷ 4 | ÷ 4 | 91125000 | a hydrogen line, $3^6 \cdot 5^3$ |
| × 16 ÷ 3 | × 16 ÷ 3 | 4860000 | the Hβ line, $2 \cdot 3^5$ |

The ring runs identically at the G2 register, every value one G-bond step up (× 1.000090150735796 = 1+δ_G); there the 486 line reads 4860438131 — the hydrogen H-face 4,860,438,133, so the g1 486 nm line and the g2 H-face are one line, one register apart. The electron speed 2187 = $3^7$ = c × α, with α = 9/125π².

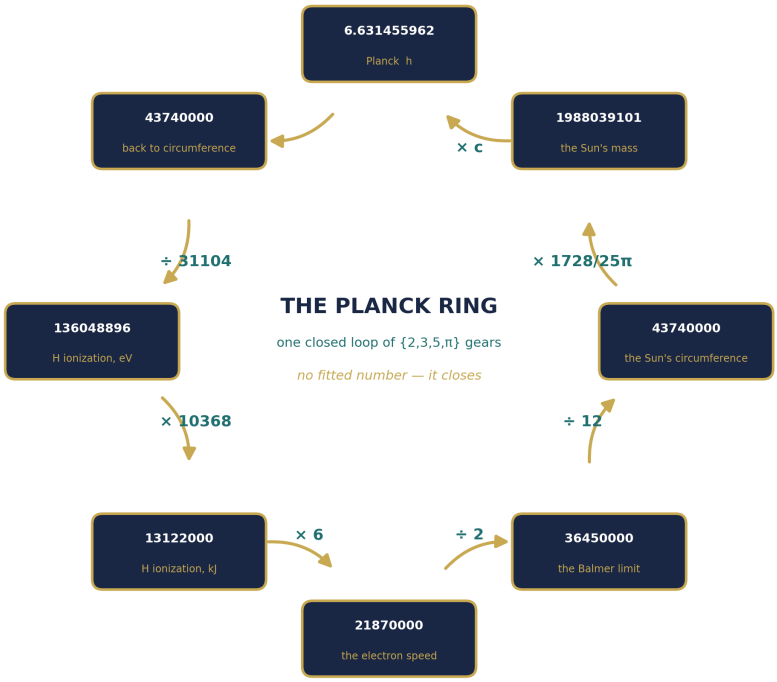


*Figure A5 — The Planck ring. Each gear is a {2,3,5,π} number; the loop returns to the Sun's circumference with nothing fitted anywhere.*

## A6. Every face on the register ladder (the chameleon)

| face (per second) | × 60 × 60 × 24 (to the day) | × 360 (degrees, the orbit) | × 2π (radians) |
|---|---|---|---|
| energy 6.631455962 | 572957.7951168 | 206264806.242048 | 3600000 |
| free fall 159.1549431 | 13750987.08280 | 4950355349.809 | 86400000 |
| frequency 1 | 86400000 | 31104000000 | 542867210.5270 |
| mass 9720 | 839808000 | 302330879963.5 | 5276669285.815 |

Every face is a per-second snapshot; × 60 × 60 × 24 lifts it to the day (one spin), then × 360 or × 2π turns it onto the orbit. 86400 × 360 = 31,104,000 seconds — the Force of Time 360-day spin-orbital year — is the same $2^7 \cdot 3^5$ that carries hydrogen's ionization energy back to the Sun's circumference in the ring: one lattice number, an energy-gear in one place and a year-of-seconds in another.


*Figure A6 — The register ladder. The same value climbs G0→G1→G2 by one G-bond step (× 1+δ_G); the speed of light is shown as the worked example.*

## A7. The higher gear — Planck through the mile

The Force of Time miles↔kilometres conversion is 1.607510288 (science uses 1.609344). Planck × 1.607510288 = 10.66013368, the higher-geared Planck value; through the same loop and ladder it lands on pure {5}-values and physical constants:

| face of 10.66013368 | value | lattice / meaning |
|---|---|---|
| frequency | 1607.510288 | the miles↔km conversion itself |
| mass | 15625000 | $5^6$ (pure {5}) |
| radial mass | 1.666666666 | 5/3 |
| energy × 86400 × 2π | 5787037.037 | the solar temperature ($2 \cdot 5^7/3^3$) |
| mass × 86400 | 1350000000 | $2^7 \cdot 3^3 \cdot 5^8$ |
| mass × 86400 × 360 | 486000000000 | the Hβ 486 line |
| ÷ 2 ÷ 36 ÷ 2π | 2356.406902393 | the sidereal rotation |

*The values in this paper are written as plain numbers — not pinned to units, and not carried to a particular power of ten. 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. The unit and the power of ten are only the costume the number wears in whichever dimension you read it from.*