THE UNIVERSAL FORCE OF TIME

The True Time Equalization

One turn of T, read through eight gears — and the equation that folds every world's rotation and orbit into one day

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

THE TRUE TIME EQUALIZATION EQUATION

$$1 \div D = 1 \div P_{rotation} - 1 \div P_{orbit}$$

The Earth: 0.997269878699 d and 365.284091377509 d → D = **1 day exactly** · **Mercury:** 58.634944237464 d and 87.952416356196 d → D = **175.904832712392 days** = 3 rotations = 2 orbits ($5^6/(3^2 \cdot \pi^2)$)

Abstract

The eight planets turn at rates spanning six hundred to one. Jupiter completes a rotation in under ten hours; Venus takes longer to turn once than it takes to round the Sun. Standard planetary science treats these as eight unrelated accidents of formation — leftovers of whatever collisions and tugs each world suffered while it was young. This paper sets out the position of the Universal Force of Time, which is the opposite: **they are not eight times. They are one time, read through eight gears.**

The argument is built in five stages, each of which can be checked independently of the others. **First a law:** where a signal thins with distance and the receiving coupling thickens by the same power, the distance cancels algebraically, with no correction terms, and every receiver gets the same. The law is shown here at three registers twenty-five orders of magnitude apart — spherical in the heavens, discrete in the atom, cylindrical in DNA — and it is the same law each time, wearing a different geometry. **Second a formula:** an observed period is one universal constant, the frequency constant T_τ, multiplied by a pure {2,3,5,π} register gear G. **Third an inverse:** the formula is required to run backwards, so that a body's observed period multiplied by its own lattice factor returns its own node — which a free parameter could not do. **Fourth a control:** a blind lattice search against a randomised null, which the orbital periods **fail**, and which is reported here in full because a framework that hides its negatives has not earned its positives. **Fifth, an equation:** the true time equalization equation, 1 ÷ D = 1 ÷ P_rotation − 1 ÷ P_orbit, which reads a world's rotation and its orbit as one amount of time meeting in the Sun's day. On the Earth it returns a day of exactly 1. On Mercury it returns 175.904832712391964312291 days, which is three rotations, two orbits and one lattice value, $5^6/(3^2 \cdot \pi^2)$, all at once.

Every one of the eight rotations then resolves as a single {2,3,5,π} value, and each is carried by a different physical identity — the identity being what the world is made of, or what reaches it. Mercury and Mars keep a bare rocky time-face, and the ratio between their two days is a pure whole-number rational with π cancelled out of it entirely. Jupiter and Saturn spin on the hydrogen they are largely made of. Neptune spins on oxygen, and its oxygen clock carries back into the Earth's own year. Venus keeps its clock on the Sun's hydrogen-beta broadcast, and its rotation is three to the fifth power of a day, moved one register step. The Earth keeps the simplest clock of all: its day is its own year, folded once. Two worlds, Saturn and Uranus, keep two clean faces one register step apart, with the recorded value between them — **which is a stated reason why those two rotation periods have never settled in the literature, and it is checkable.**

Every figure in this paper has been recomputed from its lattice form in exact rational arithmetic: integer numerators and denominators, π carried symbolically and never as a decimal, no rounding at any intermediate step. No measured value is used anywhere in the derivations. The paper states six falsification conditions in section 15,

answers the six strongest objections to the account in section 16 — including two that it does **not** answer — and closes with a full reproduction appendix so that any reader with a computer algebra system can rebuild every number in it from the routes alone.

How this paper is arranged

It is longer than a paper needs to be if the reader already works inside the framework. It is the length it is because a reader may be meeting the Universal Force of Time for the first time here, and because the account is worthless if it cannot be checked. Nothing in it is asserted that is not either derived on the page or given as an explicit assumption.

Part One — the ground. What the lattice is, how to read an address, what counts as a landing and what does not, and the arithmetic conventions this paper holds itself to. A reader already fluent in the framework can begin at section 5 and lose nothing.

Part Two — the law. The single algebraic identity the whole account stands on, given in general form and then evaluated at three registers.

Part Three — the formula. The frequency constant, the register gear, the formula itself, the true time equalization equation, and the inverse.

Part Four — the eight worlds. Each of the eight taken one at a time, at full precision, with the carrier named, the route shown in full, and the internal checks stated.

Part Five — what the account is not. The two axes it is commonly misread across, the control test that it fails, and the pure-distance law it does hold.

Part Six — the claims. The propositions in numbered form, the falsification conditions, the objections, and an honest list of what is still open.

Appendices. How to reproduce every number; a glossary of symbols; and the full value table.

PART ONE — THE GROUND

1 · What this paper claims, in plain words

Before any arithmetic, the claim in a form that can be argued with.

A planet turning on its axis is doing one thing: completing a cycle. The Universal Force of Time holds that a cycle is not an arbitrary duration but **one unit of the field's own activity** — one turn of T. Every node in the field completes that turn identically, because every node receives the same T. What differs between worlds is not how much time passes in a rotation. It is **the register the world sits in**, and therefore the units in which we read its turn off.

An analogy that is exact rather than decorative. Suppose two people each count out one full turn of a wheel, one counting in inches of rim travelled and the other in centimetres. Their numbers differ by a fixed factor and nothing else. Neither wheel turned more than the other. If you did not know about inches and centimetres you would conclude that the wheels ran at wildly different rates, and you would look for a physical cause of the difference — a cause that does not exist, because the difference is in the ruler.

That is the claim about the planetary days. Mercury's fifty-eight days and the Earth's twenty-three hours fifty-six minutes are not different quantities of time. They are the same turn of T, read through two different gears. And the gears are not free: they are built from two, three, five and π, and nothing else.

Three things follow immediately, and they are worth stating before the reader has been persuaded of anything, because they are what makes the claim a claim rather than a mood.

First, the gears must be discrete. If a gear could take any value at all, then any observed period could be matched by some gear, and the account would say nothing. The gears here are whole-number powers of four fixed quantities. There are not many of them within reach of any given number, and most numbers have none.

Second, the account must run backwards. If the formula only ever converts a node into an observed period, it is a bookkeeping device. The test is whether an observed period, multiplied by the body's own lattice factor, returns

the body's own node — a thing a free parameter cannot do, because a free parameter has no node to return to. Section 9 runs it backwards.

Third, the account must be able to fail, and must be seen to. Section 12 reports a test the framework does not pass. The orbital periods, put through the same blind lattice search that the rotations pass, land no better than randomly generated periods do. That negative is in the paper because an account that reports only its successes has not earned them.

The rest of the paper does four things: states the law that makes every node receive the same T; gives the formula that converts one turn into an observed period; works all eight worlds at full precision; and reports where the claim does **not** hold.

2 · The problem, stated fairly

Write the eight sidereal rotation periods in a column and they read like a junk drawer.

```
WORLD        SIDEREAL ROTATION          AND IN HOURS

Mercury      58.6349442375 days           1407.2386617
Venus        243.0219065966 days          5832.5257583      and it turns backwards
Earth         0.9972698787 days             23.9344770888
Mars          1.0258769844 days             24.6210476251
Jupiter       0.4135390553 days              9.9249373267
Saturn        0.4400315867 days             10.5607580799
Uranus        0.7182424905 days             17.2378197728
Neptune       0.6652356501 days             15.9656556025
```

Jupiter turns once in under ten hours. Saturn and the two ice giants take ten to seventeen. The Earth and Mars take close to a day. Mercury crawls round once every fifty-eight days, and Venus — strangest of all — takes two hundred and forty-three days to turn once, longer than its own year, and turns the wrong way while doing it. **Nothing in that list rhymes.**

The standard account treats each number as an accident of formation. Eight worlds, eight unrelated accidents; a big collision here, a captured moon there, tidal braking somewhere else. That account is not foolish — it is what you would conclude if you had no reason to think the numbers were connected, and each of its mechanisms is real. But it has a cost that is rarely stated aloud: **it forecloses the question.** Once a number is an accident, there is nothing further to ask about it. The account is complete the moment it is offered, and it makes no prediction that could distinguish it from any other history of accidents. It cannot say why the value is what it is rather than four per cent otherwise.

2.1 · Why the naive lattice attempt fails, and what that failure tells you

The obvious first move for a framework built on {2,3,5,π} is to force the eight observed days onto the lattice directly, with one flat ruler, and see what comes back. **It does not work**, and the way it fails is the useful part: foreign primes appear — eleven, thirteen, seventeen — which have no home in a universe built from two, three, five and π.

A framework in that position has two honest options. It can declare the days off-lattice and accept a hole in its account. Or it can notice that it has assumed something without saying so: **that a day at Mercury and a day at Neptune are the same kind of quantity, comparable with one ruler.** The second is the assumption this paper drops, and dropping it is what the rest of the account rests on.

> **The local flow of time itself rises with distance from the Sun, so a day is a different absolute quantity of T at each world. Each clock must be read at its own depth.**

That sentence is the whole paper compressed. Everything after it is the machinery for reading a clock at its own depth, and the checking of what comes out.

2.2 · What "one flat ruler" was doing wrong, made concrete

Take the failure at its most specific, because the shape of it recurs.

Suppose you take Neptune's rotation of 0.6652356501 days and hand it to a search that looks for whole-number exponents a, b, c, d such that 2^a·3^b·5^c·π^d reproduces it. In days it lands, and cleanly. Now hand the search

Neptune's rotation **in hours**, 15.9656556025, and it lands again — on a different address, because the unit change of twenty-four is itself $2^3 \cdot 3$ and simply shifts two of the exponents. So far nothing has gone wrong: the unit was on the lattice, so the address moved by a lattice amount.

Now do the same for a quantity whose natural unit is *not* on the lattice, or which is a sum of two lattice quantities rather than a ratio of them, and it will not land, and no amount of searching will make it land. **The lattice is closed under multiplication and division and is not closed under addition.** Half the apparent failures of a framework like this one are somebody adding two addresses together and being surprised that the result has no address.

That is not a defence of the framework; it is a constraint on it, and a sharp one. It means the framework is not permitted to expect sums to land, and it means that when it does present a value formed by addition — as it does for the Earth in section 10.4 — it must say so and explain why that particular sum is legitimate.

3 · The lattice: what a value is, and how to read an address

This section is for the reader meeting the framework for the first time. A reader who already works in it can go to section 5 without loss.

3.1 · One substance

The framework asserts a single substance, T, of which everything physical is a configuration. Not a field *in* space carrying energy *through* it — the substance itself. Space and matter are not containers for T and are not separate from it; they are what T looks like at particular densities and particular geometries.

The consequence that matters here is arithmetical rather than metaphysical. **If every quantity we measure is a count of one thing, then counts of one thing stand in exact whole-number relations to one another.** A ratio between two quantities of the same substance is not an empirical accident to be measured to as many figures as the apparatus allows; it is a whole-number fact about how many of one there are in the other. That is the claim that makes a lattice possible at all, and it is the claim to attack if the framework is wrong.

3.2 · The alphabet, and why these four

Every quantity has a position in a single structure. That position is written as an address of the form

```
value   =   2^a  ·  3^b  ·  5^c  ·  π^d          a, b, c, d whole numbers
```

and the alphabet is exactly four symbols: two, three, five and π. Nothing else appears, and nothing else is permitted to appear. The framework does not adopt this alphabet because four symbols happened to work; it adopts it because each of the four is a structural necessity of a field that turns:

- **two** is division — the halving that every branching, doubling and reflection is made of;
- **three** is closure — the smallest number of parts that can hold a stable form, and the framework's value for the speed of light in its own units;
- **five** is the helical increment — the step that makes a turn advance rather than close on itself;
- **π** is the turn itself.

A reader may find that account unconvincing as physics and still use the rest of the paper, because the alphabet is testable independently of the story told about it: either the values land on it or they do not.

Two properties of the alphabet do the real work. It is **closed** under multiplication and division — multiply or divide two lattice values and you get a lattice value. And it is **not closed** under addition or subtraction — add two lattice values and, except in special cases, you get something with no address at all. This asymmetry is not a defect. It is what separates the framework's two kinds of statement: a **ratio** between two lattice values is expected to land, and is therefore worth nothing as evidence; a **sum** is not expected to land, and is therefore worth a great deal when it does.

3.3 · An address, read out loud

Take a value from elsewhere in the framework and read it slowly, because the habit of reading addresses is most of what a new reader needs.

```
5⁶ / (2 · 3² · π³)   =   15625 / (18 π³)   =   27.9961236399301121392552 5
```

Read it as a sentence: *five to the sixth, over two, over three squared, over π cubed.* Five to the sixth is the helical increment taken six times. The π cubed in the denominator says the value has been brought down through three turns. The two and the nine are the divisions.

Now the point of the exercise. **That number is the silicon rung.** It is also, multiplied by π, Mercury's orbital period in days:

```
5⁶ / (2 · 3² · π²)   =   87.95241635619598215614537   days
5⁶ / (2 · 3² · π³)   =   27.99612363993011213925525   the silicon rung
```

One π apart. The same digits, one turn down. **This is what the framework means by a register:** the same T-value appearing at two different levels of the structure, wearing two different coats. In the heavens it wears days; at the atomic register it wears the mass of a silicon nucleus. Nobody put it in both places. It is in both places because it is one value.

3.4 · What counts as a landing, and what does not

This is the section that a hostile reader should read first, because it is where a framework of this kind usually cheats, and it is where this one states in advance what it will not allow itself.

A landing counts only if the exponent was fixed before the arithmetic. If a route is chosen — say, *this world spins on the hydrogen it is made of, at the ionisation register, brought down two turns* — and only then is the arithmetic done, then the number that comes out is a prediction and its agreement means something. If instead the target number is known and exponents are tried until something matches, the result is a fit and means nothing whatever. **A route beats a fit by two orders of magnitude**, and the difference between them is not visible in the finished formula. It is visible only in the order the work was done, which is why the framework keeps a dated register of every route as it is fixed.

A ratio between two values that are already monomials is guaranteed to land, and is not evidence. If Mercury's day is a monomial and Mars's day is a monomial, then Mercury's day divided by Mars's day is a monomial as a matter of arithmetic, not as a matter of physics. When section 10.11 observes that the Mars-to-Mercury ratio is a pure whole-number rational with π cancelled out of it, that observation is about the *shape* of the two addresses — that both carry the same power of π, and therefore belong to the same geometric class — and not about the ratio landing, which it could not fail to do.

No additive quantity is expected to land. Because the lattice is not closed under addition, a value defined as a sum of two others has no right to an address, and the framework does not claim one for it. Where a sum appears in this paper — the Earth's day, in section 10.4 — the paper says explicitly what kind of object it is and why the addition is the physical operation rather than a convenience.

A derived value is never fed forward as a check. If a quantity has been obtained from the lattice, it cannot then be used to confirm another lattice quantity; the confirmation would be circular and would look exactly like a success. Every check in this paper is against either an independent recorded observation or an exact algebraic identity.

Nothing is ever declared off-lattice, and no foreign prime is ever named as a component. If a value does not land, the framework's position is that the operation was wrong — the wrong register, the wrong unit, the wrong carrier — not that the universe contains a seventeen. This is a strong commitment and it cuts both ways: it forbids the framework the easy escape of declaring an awkward value exceptional, and it obliges it to keep looking for the operation. Section 12 is what that commitment costs when the looking does not succeed.

3.5 · The register, and one number wearing different coats

A register is a level of the structure. The same T-value appears at every register, wearing different units — 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 the costume; the digits are the claim.

This is why a hydrogen line in nanometres can stand beside a planet's turning in days and land on the same value: within the framework they were never separate quantities. It is also why the framework is indifferent to powers of ten. A factor of ten is 2·5 and is therefore already inside the alphabet; moving a decimal point is a lattice operation and costs nothing.

A new reader usually finds this the hardest single idea in the framework, and the resistance is reasonable. It amounts to saying that the choice of unit is not a human convention laid over an indifferent nature, but a choice of

which register to read at — and that the registers are real, and finite in number, and spaced by fixed steps. The evidence offered for it is not an argument. It is the recurrence: the same digit strings turning up at register after register, in quantities that have no business being related.

3.6 · Depth, and the two movers

Registers are separated by fixed steps, and only two of those steps appear anywhere in this paper. **Neither is adjustable, and neither was introduced for the planets.** Both were fixed elsewhere in the framework, against other evidence, before the rotation periods were looked at.

```
the register step    δ_G   =   5¹⁰ / (2⁴ · 3⁹ · π³)  −  1

                           =   0.000090150603356200676413 6828

the helical turn      r    =   5⁶ / (2⁶ · 3⁵)

                           =   1.004693930041152263374 49
```

δ_G is the G-bond register step. It is the step that separates the electron shells inside hydrogen, and it is the step that resolves Mercury's perihelion advance. It is also — and this is the strongest single piece of internal evidence the framework has for it — the exact ratio of two independently derived steps that were never built to be divided by one another:

```
the 703 step   =   800 / (81 π²)      =   1.000703048319385396976587291
the 612 step   =   2⁹ · 3⁵ · π / 5⁸   =   1.000612842467910951824814692

703 step  ÷  612 step   =   1 + δ_G      exactly, to symbolic zero
```

That identity is not approximate and does not depend on the precision of any decimal. Reduced symbolically, the difference between the quotient and 1 + δ_G is zero.

r is the rotation step of the T-helix — the number that sets the twist of the DNA in your cells, and the number that carries a body from one face of a helical turn to the next. It is a little over fifty-two times the size of δ_G.

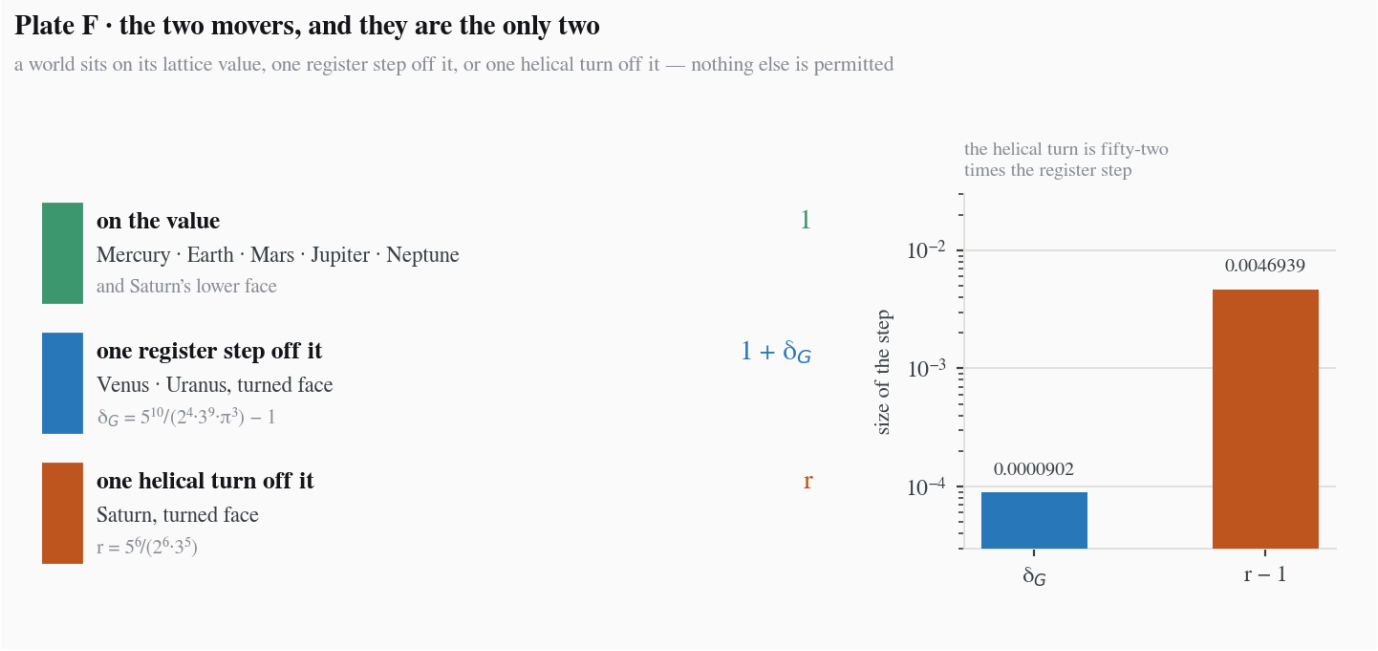


Figure 1 — The two movers, and there are only two. A world's clock sits on its lattice value, or one register step off it, or one helical turn off it. Six of the eight sit directly on the value. Venus and one Uranian face sit one register step off. One Saturnian face sits one helical turn off. Nothing else is permitted, and no third mover is introduced anywhere in this paper. The bar chart at the right gives the two steps to scale: the helical turn is fifty-two times the register step, and even the larger of them is under seven minutes in an Earth day.

The constraint that matters is the one drawn on the right of the plate: **these are the only two displacements the account is allowed.** A framework that could move a value by any small amount to make it fit would be unfalsifiable. This one has two named steps, both fixed elsewhere, and if a world's clock does not sit on its value or on one of those two steps from it, the account has failed for that world and must say so.

3.7 · Why this matters for the days

If the flow of time itself differs by register, then a "day" is not one kind of quantity. It is a local reading. To compare two worlds you must either bring both to one register, or accept that you are comparing two different things.

The naive lattice attempt of section 2.1 did the latter without noticing, and the foreign primes are the receipt. What follows is the machinery for doing it properly.

4 · The arithmetic conventions of this paper

Stated once, and held to everywhere.

Exact rational arithmetic throughout. Every value in this paper was computed with integer numerators and integer denominators, with π carried as a symbol and never as a decimal. Nothing is rounded at an intermediate step. A decimal appears only at the moment of printing, and is then a rendering of an exact object rather than the object itself.

Full precision, always. Values are printed to twenty-two significant figures or to the precision needed to make the point, whichever is longer. The framework does not round, because rounding is where a route quietly becomes a fit: two values that agree to four figures agree by coincidence far more often than two that agree to sixteen, and a paper that prints four has thrown away the evidence that distinguishes them.

No measured value is used in any derivation. Recorded observations appear in this paper in exactly two places: the table in section 2, which states the problem, and the control test in section 12, which is a test *of* the framework and must therefore be fed from outside it. Nowhere does a derivation take a measured number as an input.

Identities are verified symbolically, not numerically. Where the paper says two expressions are equal — 703 ÷ 612 = 1 + δ_G, Mercury's rotation-to-orbit ratio is exactly two thirds, Neptune's day form and hour form are the same object — the equality was established by symbolic reduction to zero, not by comparing decimals. A numerical agreement to twenty figures is strong evidence; a symbolic zero is proof, and where proof is available the paper uses it.

Every route is shown, and never abbreviated. A value is never presented as a bare number with the assurance that it lands. The route from the alphabet to the value is written out, so that a reader can disagree with the route rather than with the arithmetic.

Appendix A gives the full computation. Every number printed here can be regenerated from the routes alone, in any computer algebra system, in a few seconds. The reader who does not wish to take a single figure on trust does not have to.

PART TWO — THE LAW

5 · Signal × coupling = constant

The law comes first because the formula in section 8 is a consequence of it, not an addition to it. If the law is wrong, the formula has nothing to stand on; if the law is right, the formula is almost forced.

5.1 · The law in one line

```
a signal that thins with distance
    ×  a coupling that thickens by the same power
    =  a constant
```

That is the whole of it. Whenever a source spreads its output over a growing geometry, and the thing receiving it grows by exactly the same power, **the distance cancels and every receiver gets the same amount.** The law does not change from scale to scale. Only the geometry it is dressed in changes, and the geometry fixes the power.

5.2 · The general statement

Because the paper will evaluate the law at three different geometries, it is worth having it once in a form that covers all three and commits to nothing about which.

Let a source of total output T⊙ spread that output over a geometry whose extent at parameter x grows as A(x). The signal density arriving at x is T⊙/A(x). Let a receiver at x present a coupling cross-section C(x). Then the received quantity is

```
T_recv(x)   =   [ T⊙ / A(x) ]  ×  C(x)   =   T⊙ · C(x)/A(x)
```

and the received quantity is **independent of x if and only if C(x) is proportional to A(x)**. There is no approximation anywhere in that statement and no small parameter hiding in it. Either the coupling matches the spreading or it does not; if it does, the cancellation is algebraic and exact at every value of x, including values never observed.

The three registers of this section differ in one respect only: what A(x) is.

```
spherical spreading      A(d) = 4πd²          the coupling must go as d²
discrete shell spacing   A(n) = n²            the coupling must go as n²
cylindrical spreading    A(ρ) = 2πρ           the coupling must go as ρ
```

The claim of the framework is not that the exponent is always two. It is that **whatever the geometry does, the coupling does the same** — and that this is not a coincidence to be explained case by case but the single structural fact that makes a field of one substance possible at all. A field in which the coupling did *not* match would deliver different amounts to different positions, and the positions would then be running on different clocks in an irreducible sense; there could be no common time, and no common physics.

5.3 · The cathedral

Picture a sound filling a cathedral. As it spreads it grows thinner — quieter the farther you stand. That is the signal, and it falls with distance. Now imagine that the farther you stand, the larger your ear grows, exactly fast enough to gather back what the distance took away. That is the coupling, and it rises with distance.

If the signal falls by one power of distance and the coupling rises by the same power, the two are exact inverses. The distance cancels — **not approximately, but algebraically, with no correction terms** — and every listener in the cathedral hears precisely the same note. That preserved note is the constant: the same T delivered to every position, however near or far.

The image is worth holding onto because it makes the strangeness of the claim visible. It is not strange that a sound thins with distance; everybody knows that. What is strange is the ear. The framework is asserting that a node's capacity to receive T is not a property the node carries around with it but **a property of where the node is** — and that it grows precisely as fast as the dilution, everywhere, always.

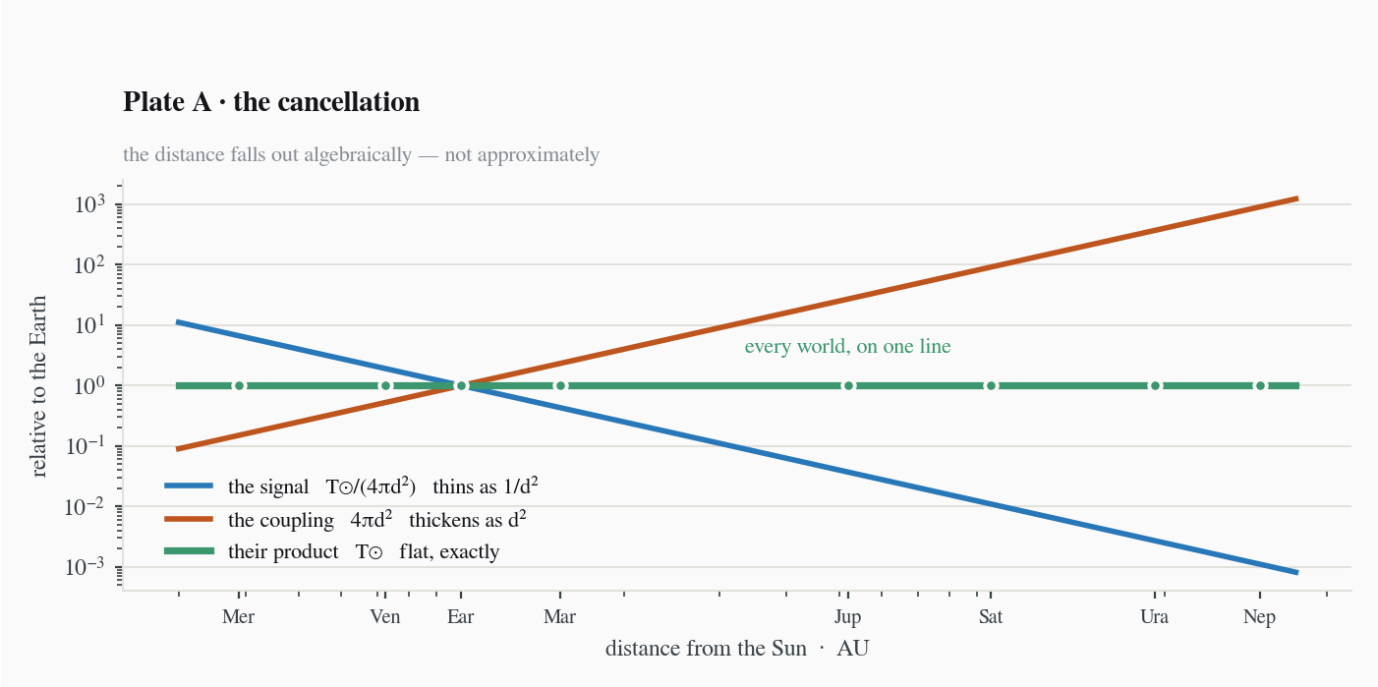


Figure 2 — The cancellation. The signal thins as the inverse square of distance; the node's T-receiving cross-section thickens as the square. Their product is flat, and every world sits on the flat line. Mercury's signal is diluted to one part in 6.67 and its coupling is multiplied by exactly 6.67; Saturn's is diluted ninety-one fold and multiplied ninety-one fold. Every row multiplies to unity. This is not a fit — it is the identity $d^2 \cdot (1/d^2) = 1$ evaluated at each real distance.

5.4 · The celestial register — the d² cancellation

The T-field leaves the solar core and spreads outward in every direction at once, over the surface of an expanding sphere. The surface area of a sphere of radius d is $4\pi d^2$, so by the time the signal reaches a planet at distance d it has been spread across that whole area:

```
the signal density at distance d   =   T⊙ / (4π·d²)
```

That is the falling half. Now the coupling. **A planet at distance d occupies a node whose T-receiving cross-section grows in exact proportion to the same area, $4\pi d^2$.** This is the physical claim, and it is where the framework parts company with the standard picture — nothing in the conventional account assigns a planet a receiving cross-section that grows with its orbital radius.

```
the total T received per unit time

    T_recv   =   [ T⊙ / (4π·d²) ]  ×  [ 4π·d² ]   =   T⊙
```

The $4\pi d^2$ terms cancel identically. **Every planet, at every orbital radius, receives the same T per unit time — the whole solar output, with no dependence on distance whatsoever.** Not approximately, not on average: by the algebra, prior to any mechanism.

The same cancellation has a second form worth stating, because it says something the first does not. Take the Sun's dimensional size as a node experiences it, R⊙/d, and multiply by the node's own T-sphere radius, d. The product is R⊙ at every register:

```
T⊙(n) × Ξ_n   =   R⊙        constant at every dimensional register
```

However much the source shrinks as you move outward, the node's sphere grows to match. The Sun never becomes effectively smaller to any node. A reader who wants one sentence for why the Sun is the generator of time in this framework can take that one: it is not that the Sun is bright, or hot, or large. It is that the Sun is the same size to everything.

5.5 · The atomic register — n² cancels

Shrink the same law by twenty-five orders of magnitude and it reappears unchanged inside the atom.

An electron in a hydrogen atom sits in a shell labelled by a whole number n. The energy needed to tear it free falls as the inverse square of that number, exactly as the solar signal falls with distance. **The shell number plays the part of distance.**

```
the falling signal      IE(n)  =  G₁ / n²,      G₁ = 3⁸/5 = 1312.2 kJ/mol
the rising coupling     a shell n holds 2n² electrons
the product             IE(n) × 2n²  =  2·G₁    independent of n
```

Every shell delivers the same total to its electrons, and a full shell — the noble-gas state — is equalization complete. That is the framework's account of why the noble gases are inert: not a special stability conferred by some extra force, but a register that has finished equalizing and has nothing left to exchange.

Two things about the atomic case are worth pausing on, because they are what make it a genuine second instance of the law rather than a restatement of the first.

The geometry is discrete, not continuous. There is no shell at n = 2.4. The cancellation therefore holds at a countable set of points rather than along a curve, and the fact that it holds at each of them is a stronger statement than continuous cancellation, not a weaker one: a continuous curve can be forced flat by a smooth adjustment, and a set of integer points cannot.

The shell capacity 2n² was not derived here to make the law work. It is the ordinary occupancy of atomic physics, known for a century, and it is exactly the inverse of the ordinary inverse-square shell energy. The framework's contribution is not the two facts but the observation that they multiply to a constant — and that this is the same constancy the planets show.

5.6 · The molecular register — the radius cancels

In B-form DNA the geometry is cylindrical. The T flows along the helical axis and out to the backbone. The signal falls as 1/ρ and the coupling — the circumference available at radius ρ — rises as 2πρ.

```
T per base pair   =   [ T_axis / ρ ]  ×  [ ρ / 2π ]   =   T_axis / 2π
```

The radius cancels, just as d² cancelled for the planets and n² for the shells. **Every base pair — near the axis or out at the backbone — receives the same T_axis/2π**, which is why every base pair in a strand holds temporal coherence with every other regardless of where it sits in the helix.

The exponent here is one rather than two, and that is the point of including the case. If the framework's claim were "everything goes as the inverse square", the DNA register would refute it. The claim is the general statement of 5.2 — coupling matches spreading — and cylindrical spreading goes as the first power. The law survives a change of exponent because the exponent was never the law.

5.7 · Three geometries, one law

```
REGISTER      GEOMETRY       WHAT CANCELS      WHAT IS PRESERVED

celestial     spherical      d²                every planet receives the whole solar T
atomic        discrete       n²                every shell delivers 3⁸/5 kJ/mol
molecular     cylindrical    the radius        every base pair receives T_axis/2π
```

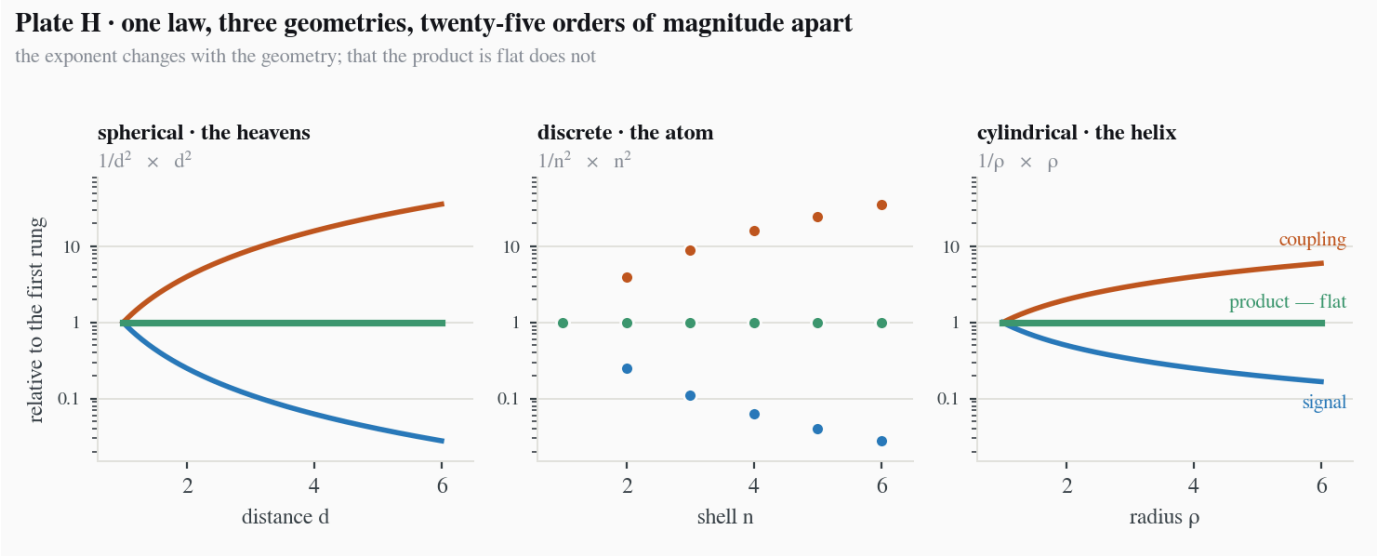


Figure 3 — One law, three geometries. In each panel the signal (blue) thins, the coupling (rust) thickens by the same power, and their product (green) is flat. The middle panel is drawn as points rather than a line because the atomic register is genuinely discrete — there is no shell between two and three — and the cancellation holds at each integer separately. The exponent differs from panel to panel; the flatness does not.

Three scales twenty-five orders of magnitude apart, three geometries, **one identity**. The law is one; the costume is the geometry. And this is the deepest regularity the framework claims: not that the numbers are pretty, but that the same cancellation is doing the same work at every scale at which we can look.

5.8 · What the law does not say

Because the law is simple it is easy to overclaim on its behalf, and a careful reader will already be drafting objections. Three of them are correct, and the paper concedes them here rather than in the objections section, because they are limits on the claim rather than attacks on it.

It does not say the received T is large, or measurable in isolation. The law fixes that every node receives the same amount. It says nothing about what that amount is in any external unit, and the framework does not offer a way to weigh it directly.

It does not by itself explain the rotation periods. All the law establishes is that the *input* is identical everywhere. The differences between worlds must therefore live entirely in how the input is read — which is what sections 6 to 10 are for. The law is what makes the question "why do they differ?" answerable at all; it is not the answer.

It does not follow from the cancellation that the coupling claim is true. The algebra is unimpeachable and the physics is an assertion. That a node's T-receiving cross-section grows as $4\pi d^2$ is a claim about nature that the framework makes and that nothing in the mathematics of section 5.2 supports. The support offered for it is entirely a posteriori: it is the claim under which the eight rotation periods resolve, and section 15 states what would have to be observed for it to be abandoned.

PART THREE — THE FORMULA

6 · The frequency constant T_τ

The law of section 5 says every node receives the same T. This section names the quantity that follows from it.

T_τ, the frequency constant, is one rotation. One turn. 2π of angle. 86,400 native ticks. It is not a duration in seconds — it is **a quantity of the field's own activity**, and it is identical for every body, because section 5 has just shown that every body receives an identical T.

6.1 · One rotation is one turn

The identification is worth slowing down on, because a reader can accept everything in Part Two and still not see why it licenses a *constant*.

Section 5 establishes that the T arriving at each node per unit of the field's own activity is the same at every node. A rotation is a node completing one closed cycle of that activity. If the input is identical and the cycle is one closed circuit of it, then **one rotation is the same quantity of T everywhere**, whatever number of seconds it takes when a particular observer counts it. The seconds are the observer's; the turn is the field's.

This is the sense in which the framework's answer to "why does Mercury take fifty-eight days?" is not a longer version of the standard answer. The standard answer is about how Mercury got to be slow. The framework's answer is that Mercury is not slow — that Mercury completes exactly the turn Jupiter completes, and that the fifty-eight is an artefact of reading a Mercury turn on an Earth dial.

6.2 · Why 2π, and why 86,400

Two remarks, because both are load-bearing.

T_τ is not measured; it is defined by the cancellation. Nothing about it is fitted to the planets. If the d^2 cancellation of section 5.4 holds, then a constant of this kind exists, and there is exactly one of it. It has no adjustable content: it cannot be tuned to make a world land, because it is the same object in every world's formula and moving it moves all eight together.

2π is the turn. It is the angle of one closed circuit and it is a member of the alphabet. Nothing further is claimed for it.

86,400 is a lattice integer, not a human convention.

> $86{,}400 = 2^7 \cdot 3^3 \cdot 5^2$

The framework's position is that the second and the day are not arbitrary units that happen to divide the Earth's rotation, but the Earth's own register showing through the counting — that the Babylonians did not invent the sixty, they found it. Whether or not a reader accepts that story, **the arithmetic below does not depend on it**: 86,400 enters as a pure {2,3,5} number and would do exactly the same work under any name, in any culture, on any planet.

It is worth noticing how much of ordinary timekeeping is already inside the alphabet without anybody having intended it:

> $24 = 2^3 \cdot 3$ — hours in a day
> $60 = 2^2 \cdot 3 \cdot 5$ — minutes in an hour, seconds in a minute
> $216 = 2^3 \cdot 3^3$ — the Venus de-projection of section 9.2
> $360 = 2^3 \cdot 3^2 \cdot 5$ — degrees in a turn
> $864 = 2^5 \cdot 3^3$ — the solar-day carrier
> $86400 = 2^7 \cdot 3^3 \cdot 5^2$ — seconds in a day

Not one of them contains a seven, an eleven or a thirteen. A sceptic is entitled to say that this is because highly divisible numbers are convenient for counting and were chosen for that reason, and that is a fair account of the sixty. It is a less comfortable account of the way those same numbers reappear, unchosen, in the exponents of section 10.

6.3 · What T_τ is not

It is not a period. It does not have units of seconds and it cannot be quoted in them. Where the paper writes $T_\tau \cdot G$ and gets a number of days, the days come from G, which carries the unit relabels; T_τ contributes the turn and nothing else. A reader who tries to attach seconds to T_τ will get the dimensions of everything downstream wrong.

7 · The register gear G

If every body completes the same turn, then the difference between two observed periods lies entirely in the conversion. **G is that conversion, and it is not free.**

```
G  =  a pure {2,3,5,π} object, assembled from

       the unit relabels          {24, 60, 864, 2π}
       the target node's smooth number
       the observing node's mass
       and  c = 3
```

Each of the four parts is a different kind of thing, and conflating them is the commonest way to misunderstand the formula.

7.1 · The unit relabels

These are the ordinary conversions between the ways a turn can be counted — hours in a day, minutes in an hour, the 864 that carries the solar day, the 2π of one full angle. All are {2,3,5}. **They carry no physics; they carry bookkeeping.**

It follows that any statement of the framework which depends on a unit relabel is not a physical statement. If Mars's day is $81/(8\pi^2)$ in days and $3^5/\pi^2$ in hours, nothing physical has happened between those two expressions: $24 = 2^3 \cdot 3$ has moved from one side to the other. The relabels are in the gear because the gear has to deliver a number in some unit, not because they mean anything.

7.2 · The target node's smooth number

This is the world's own address — the thing that makes Jupiter's gear different from Saturn's — and **it is the part that does the physical work.** Section 10 gives it world by world, and it is the only part of G that varies from world to world for a reason.

"Smooth" here has its ordinary arithmetical sense: a smooth number is one whose prime factors are all small. The framework's version is stricter — the factors must be drawn from the alphabet — and the smooth number of a node is the framework's name for that node's position in the structure. It is set by what the world *is*: what it is made of, and which register that material's identity sits at.

7.3 · The observing node's mass

A reading is always taken from somewhere. **The lens is the looker's T-density.** In the worked cases of this paper the Earth is the observer, and the Earth's mass enters the relabel directly.

This is the part of the gear that a reader is most likely to reject, and the rejection is reasonable: it makes the observed period explicitly relational, and it means that the same rotation observed from Mars would carry a different gear. The framework accepts that consequence and states it as a proposition in section 14 rather than burying it. **The rotation period of a planet is not a property of that planet alone.** It is a property of the pair.

7.4 · c = 3

In the gear, c is the framework's dimensional spin-orbit factor at this register, and its value is three. **It is not the metric speed of light**, and no conversion between them is offered here. The framework's position on the metric value is that it is the same object wearing the coat of a particular unit system; the paper does not need that claim and does not make it.

7.5 · The gear, assembled — and why the assembly is a constraint

Because every part is lattice and the lattice is closed under multiplication and division, **G is itself a lattice value, always.**

That is a constraint, not a convenience, and it is the single most important sentence in this section. It means the account cannot quietly absorb a world that does not fit. Given T_τ fixed and G obliged to be a small-exponent lattice number, an observed period either is T_τ times such a number or it is not, and there is no third option and no adjustable remainder. **A world whose observed period cannot be written that way is a counter-example, and the framework has no machinery for accommodating one.**

Section 16.2 takes seriously the objection that the lattice is dense enough to hit anything, and answers it with counting rather than assertion.

8 · The formula

```
T_observed(B | A)   =   T_τ  ·  G
```

Read aloud: the period of body B as observed from body A is the one universal turn, multiplied by a pure lattice gear. Since T_τ and G are both lattice, **every observed period is one constant times a lattice number**, and all rotations are one flow of time in different registers.

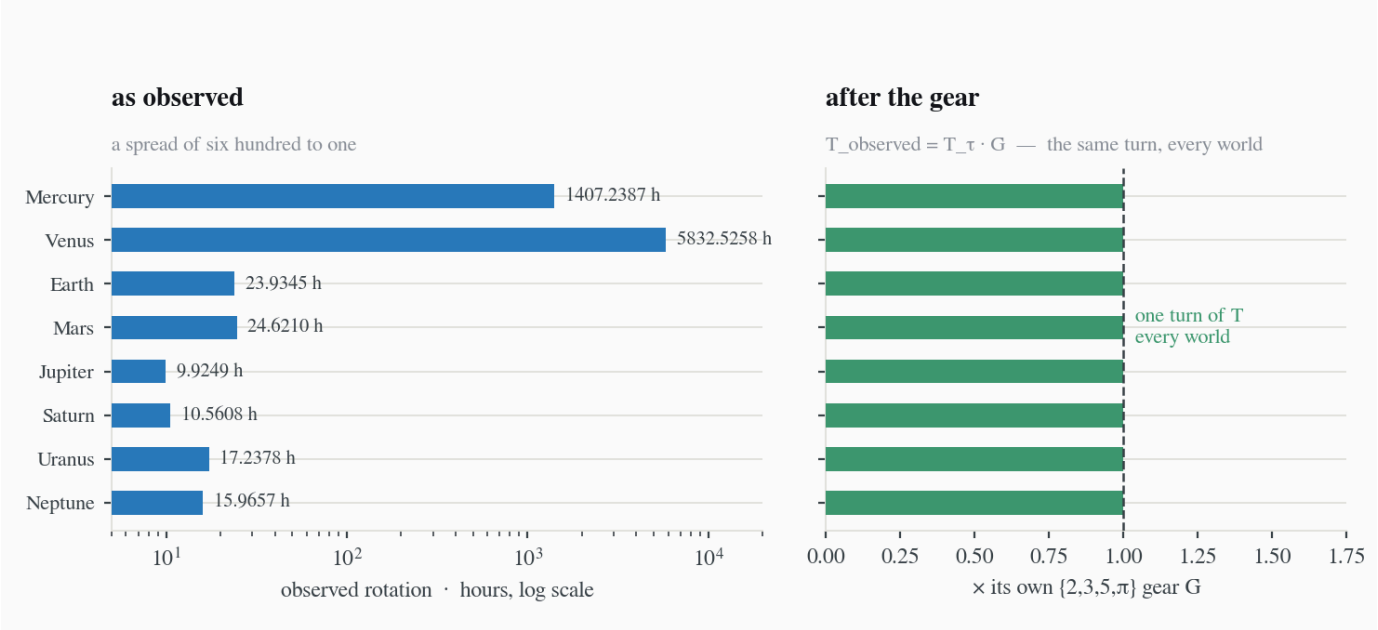


Figure 4 — The collapse. Left: the eight sidereal rotations as observed, on a logarithmic axis — a spread of six hundred to one. Right: each multiplied by its own {2,3,5,π} register gear. Every world returns the same turn. The spread was never in the time; it was in the units the time was wearing.

8.1 · What the formula says dimensionally

T_τ is a turn. G is dimensionless in the framework's own accounting — it is a pure number built from the alphabet — but it carries the unit relabels, and it is those relabels that decide whether the answer comes out in days or in hours. The formula therefore does not convert a physical quantity into another physical quantity. **It converts one turn into a reading of that turn**, and the reading is where all the apparent variety lives.

A useful way to hold it: the left side is what a clock on the Earth says; the right side is what the field did. The field did the same thing eight times.

8.2 · The one-sentence form

For a reader who wants the claim without the machinery:

> There is a single clock — the frequency constant, one turn of T. Every planet reads it; the {2,3,5,π} register gear only relabels the units, and the observer's mass sets the dial. **Fifty-eight days against twenty-four hours is not different time. It is the same turn, factored through a lattice gear.**

8.3 · The true time equalization equation — rotation and orbit meet in one day

Sections 6 to 8 say that every rotation is the same quantity of time, one turn of T, read through a different gear. A world keeps a second clock as well: its orbit. This section puts the two clocks into one equation and shows that, read from the Sun, **a world's rotation and its orbit are the same amount of time**, however many days or hours each is counted in.

```
THE TRUE TIME EQUALIZATION EQUATION

    1 ÷ D   =   1 ÷ P_rotation   −   1 ÷ P_orbit

or, the same equation turned round:

    D   =   P_rotation  ×  P_orbit  ÷  ( P_orbit  −  P_rotation )
```

What each part is.

- **P_rotation** is the turn of the world against the stars, the rotation of section 10.
- **P_orbit** is one circuit of the Sun.
- **D** is the world's day as the Sun reads it: the time from one noon to the next. It is the time in which the rotation and the orbit come back into step.
- **1 ÷ P** is a rate: turns per day. Subtracting the orbit's rate from the rotation's rate is the one operation the equation allows, and it is not an arithmetical convenience. The world turns against the stars, the Sun moves round against the stars at the orbit's rate, and the difference between the two is what the world actually turns against the Sun.

The arithmetic form is old. Astronomers have used this relation between the sidereal day, the year and the solar day for centuries, and this paper does not claim to have found it. What the Universal Force of Time adds is what goes in and what comes out. **Both inputs are lattice values fixed elsewhere in the framework, before this equation was written, and the output lands on the lattice as well.** The day is not a third clock. It is the place where the two clocks are one.

The Earth, worked in full.

```
P_rotation  =    0.997269878699237979581  days     =  Y ÷ (Y + 1)        section 10.4
P_orbit     =  365.284091377509139636651  days     =  15π⁴ / 4           the year

1 ÷ 0.997269878699237979581    =  1.002737595267915823   turns a day
1 ÷ 365.284091377509139636651  =  0.002737595267915823   orbits a day
difference                     =  1.000000000000000000

D   =   1  day,   EXACTLY
```

The Earth's day comes back as exactly one day, to every digit. Nothing is fitted. The year is 15π⁴/4 and the rotation is that year folded once, and the equation returns the whole number 1. Counted over the year the same fact reads:

```
366.284091377509139636651  turns against the stars   ×   0.997269878699237979581  d
    =   365.284091377509139636651  days

365.284091377509139636651  days against the Sun      ×   1  d
    =   365.284091377509139636651  days

two counts, one year:   the one extra turn against the stars IS the orbit
```

Mercury, worked in full.

```
P_rotation  =   58.634944237463988104097  days     =  5⁶ / (3³·π²)      section 10.1
P_orbit     =   87.952416356195982156145  days     =  5⁶ / (2·3²·π²)

1 ÷ 58.634944237463988104097   =  0.017054676405082412   turns a day
1 ÷ 87.952416356195982156145   =  0.011369784270054941   orbits a day
difference                     =  0.005684892135027471

D   =   175.904832712391964312291  days   =   5⁶ / (3²·π²)

3  ×  58.634944237463988104097   =   175.904832712391964312291  days
2  ×  87.952416356195982156145   =   175.904832712391964312291  days
```

Three rotations, two orbits and one day of Mercury are one and the same length of time: 175.904832712391964312291 days. On the symbols the three readings are identical — 3 × 5⁶/(3³·π²), 2 ×

$5^6/(2\cdot3^2\cdot\pi^2)$ and $5^6/(3^2\cdot\pi^2)$ — so the day is not an approximation that happens to sit near the other two. It is a lattice value in its own right, a single address that the rotation and the orbit both reach.

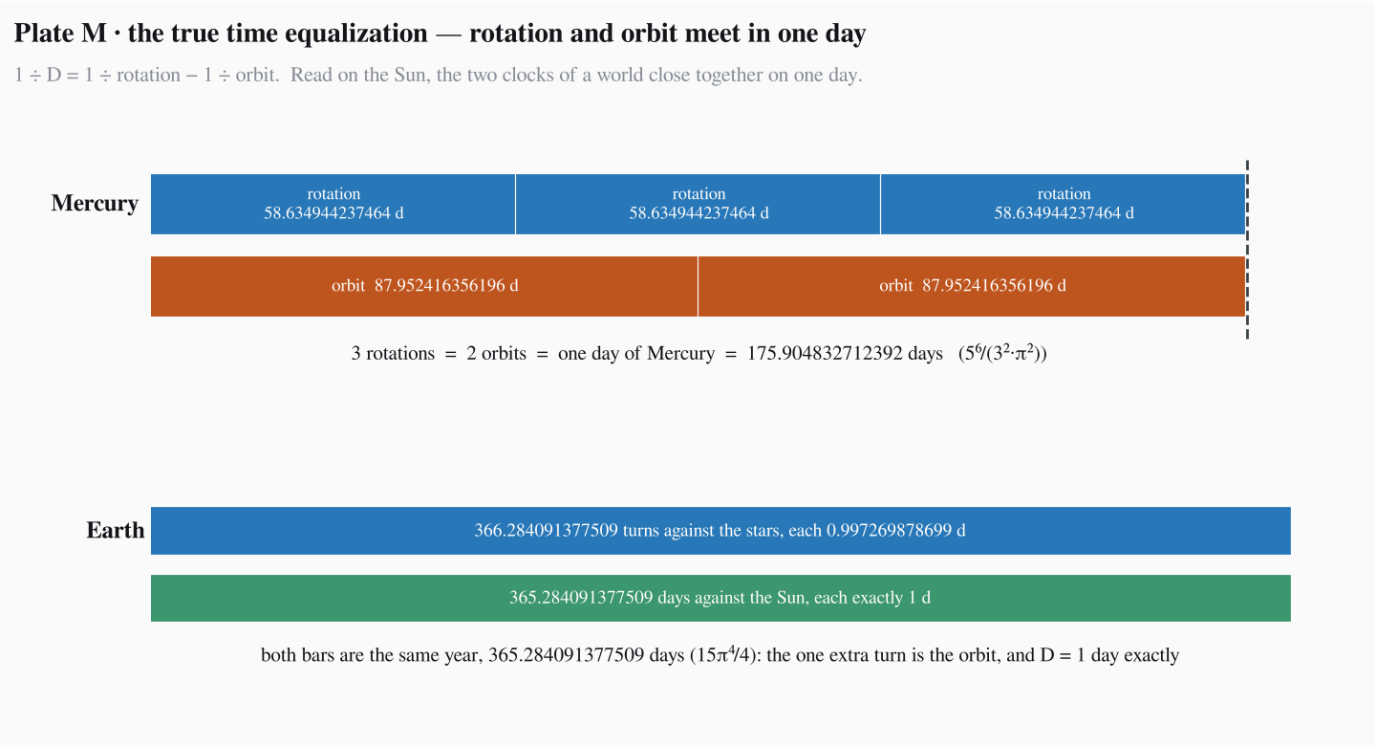


Figure 5 — **The true time equalization.** Above: Mercury. Three rotations of 58.634944237464 days and two orbits of 87.952416356196 days close together on one day of Mercury, 175.904832712392 days = $5^6/(3^2\cdot\pi^2)$. Below: the Earth. The same year holds 366.284091377509 turns against the stars and 365.284091377509 days against the Sun; the extra turn is the orbit, and the day comes out at exactly 1.

What the equation says, in plain words. A rotation and an orbit are not two quantities of time that happen to coexist. They are two readings of one turn, and the Sun's day is where the two readings agree. On the Earth they agree after one day. On Mercury they agree after three turns and two circuits. In both cases the meeting point is a number the lattice already holds — 1, and $5^6/(3^2\cdot\pi^2)$.

Where the equation can be applied, and where not yet. The equation needs both clocks on the lattice. Section 12 shows that the recorded orbital periods do not, as a set, beat a randomised control, so this paper does not invent orbital addresses to feed the equation. It is applied here only where both clocks are already fixed: the Earth, whose year is $15\pi^4/4$, and Mercury, whose orbit is forced by its 3:2 lock. **Venus turns backwards**, so for Venus the subtraction becomes an addition, 1 ÷ D = 1 ÷ P_rotation + 1 ÷ P_orbit, and the equation waits on a lattice value for Venus's orbit. Section 17 lists both.

```
THE TRUE TIME EQUALIZATION, IN ONE LINE

turns against the stars  −  circuits of the Sun   =   days of the Sun

Earth, one year:      366.284091377509  −  1   =   365.284091377509
Mercury, one day:       3               −  2   =     1
```

9 · The inverse, which is where the formula earns its keep

A formula that only runs forwards can be accused of absorbing anything: given a target, find a gear. **This one is required to run backwards, and that is the test that matters.**

```
T_node(B)   =   T_observed(B) · F_B ,        F_B  built from {2, 3, 5, π}
```

Multiply a body's observed period by its own lattice factor and **its own node must come back**.

9.1 · Why an inverse is a test a free parameter fails

The logic is worth stating carefully, because it is the paper's main defence against the charge of curve-fitting.

Suppose the gear G were a free parameter — a number chosen after the fact to make $T_\tau \cdot G$ equal the observed period. Then running the formula backwards would return, by construction, exactly the observed period divided by the gear, which is T_τ. Nothing would have been learned: you would get back the constant you started with, in every case, necessarily.

The inverse tested here is a different operation. It multiplies the observed period by a factor fixed independently of the target, and asks whether the result lands **on a named object at another register** — something the framework already had, for other reasons, before the planet was looked at. A free parameter has no such object to land on. **If the landing happens, it happens because the two registers are connected, or it does not happen at all.**

That is the standard the next two subsections are held to, and it is why they are the only two full inverses the paper claims. The remaining five worlds are not worked as inverses here, and section 17 says so.

9.2 · Venus, worked in full — and a correction to the working notes

Venus's rotation, read in hours, is 5832.5257583187733623 h. The de-projection factor is 1/216, and 216 is $2^3 \cdot 3^3$ — a pure lattice number fixed by the register, not by Venus.

```
5832.5257583187733623   ×   1/216   =   27.002434066290617418263
```

The working notes of 17 July record this landing as **27 = 3³ exactly**. That is very nearly right, and it is worth being precise about, because the small difference is not an error — it is the physics.

```
the BARE face          3⁵ days  =  5832 h      5832 / 216  =  27       exactly, 3³
VENUS'S OWN day        3⁵ · (1 + δ_G)          de-projects to 27 · (1 + δ_G)
                                               =  27.002434066290617418263
```

Venus does not sit on the bare 3^5 face. It sits one register step above it, and the de-projection carries that step through faithfully, landing on 27 times the step rather than on 27. Both are lattice objects. The step is not noise and it is not a residual: it is the same δ_G that separates the shells inside hydrogen, and its appearance here is the two-face structure of section 10.9 showing up in the inverse exactly where it should.

Corrected statement of the Venus de-projection:

```
T_node(Venus)  =  T_observed(Venus) · 1/216  =  3³ · (1 + δ_G)

               =  27.002434066290617418263
```

The correction is filed rather than quietly absorbed, because the difference between 27 and 27.0024 is exactly the difference between a framework that rounds and a framework that does not. A reader who checks the notes against this paper will find the discrepancy; it is better that the paper find it first.

9.3 · Mercury, worked as a second inverse — and it lands at the atomic register

Mercury's rotation is 58.634944237463988104 10 days. Multiply it by 3/2 — a lattice factor of the simplest possible kind — and Mercury's own orbital period comes back, exactly:

```
58.63494423746398810410  ×  3/2   =   87.952416356195982156145 37   days

and     5⁶/(3³·π²)  ×  3/2   =   5⁶/(2·3²·π²)      identically
```

This is Mercury's 3:2 spin-orbit lock, and the framework does not obtain it by fitting: it falls out of the two addresses, which differ by a factor of 3/2 and nothing else. Three rotations to two orbits, as observed since 1965, is here an exponent relation rather than a dynamical outcome.

Now take one further step, and this is the part that a free parameter cannot imitate. Divide by π — one turn down, one register lower — and the result is not a planetary quantity at all:

```
58.634944237463988104 10  ×  3/(2π)   =   27.99612363993011213925525

which is     5⁶/(2·3²·π³)     =     the silicon rung
```

Verified symbolically: the difference between the two expressions reduces to zero, not to a small number. **Mercury's observed rotation, multiplied by a lattice factor of 3/(2π), returns an object the framework had already fixed at the atomic register for reasons having nothing to do with Mercury.** That is what an inverse is for. It is the one operation in this paper that a fitted gear has no way to produce.

9.4 · The gear ladder

The de-projection factors are not scattered. Across three neighbouring readings they form a ladder that is itself a lattice object, with **5^3 held fixed while the denominator halves**:

```
Mercury    →    Mars-distance    →    Mars-speed
 125/108   →      125/54          →      125/27
```

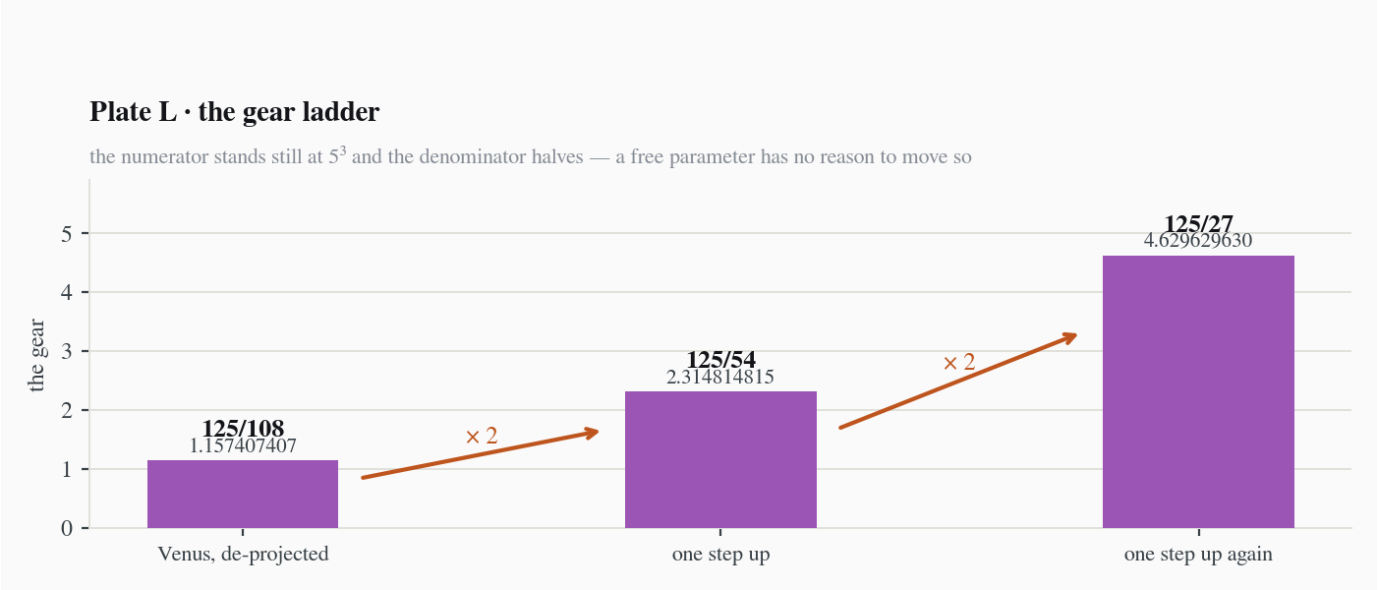


Figure 6 — The gear ladder. Three consecutive de-projection factors, with the numerator standing still at 5^3 and the denominator halving at each step. A set of independently chosen fudge factors has no reason to arrange itself this way; a set of positions one register step apart has every reason to.

That the factors themselves lie on a clean ladder is a structural check the framework did not have to pass, and it is a different kind of evidence from a landing. A landing says: this number is on the lattice. A ladder says: **these numbers are on the lattice in an order**, and the order is the register order.

9.5 · Mars, and a discipline that came out of it

The Mars de-projections are all clean monomials in {3,5,π}:

```
375/π²     =  37.995443865876664291
375/(2π²)  =  18.997721932938332146
3⁸/(5³·π²)=   5.3181462870190249475
2·3⁸/(5³·π²) = 10.636292574038049895
```

One of them was initially called off-lattice by eye and was not — it is $3^8/(5^3\cdot\pi^2)$, and factoring it settles the matter in one line. The number 5.318 does not look like a lattice value; $6561/(125\pi^2)$ plainly is one.

> **Standing discipline.** Never declare a result of a multiply, divide or power chain off-lattice by eye. **Factor it.** Closure guarantees that lattice ÷ lattice is lattice; only addition and subtraction can break it, and a chain of ratios contains neither.

PART FOUR — THE EIGHT WORLDS

10 · The eight worlds, one at a time

This is the body of the paper. Each world is given its form, its exact value, the route in full, and the physical identity that carries it. **No measured figure is used in any derivation.** The framework's own values are the values.

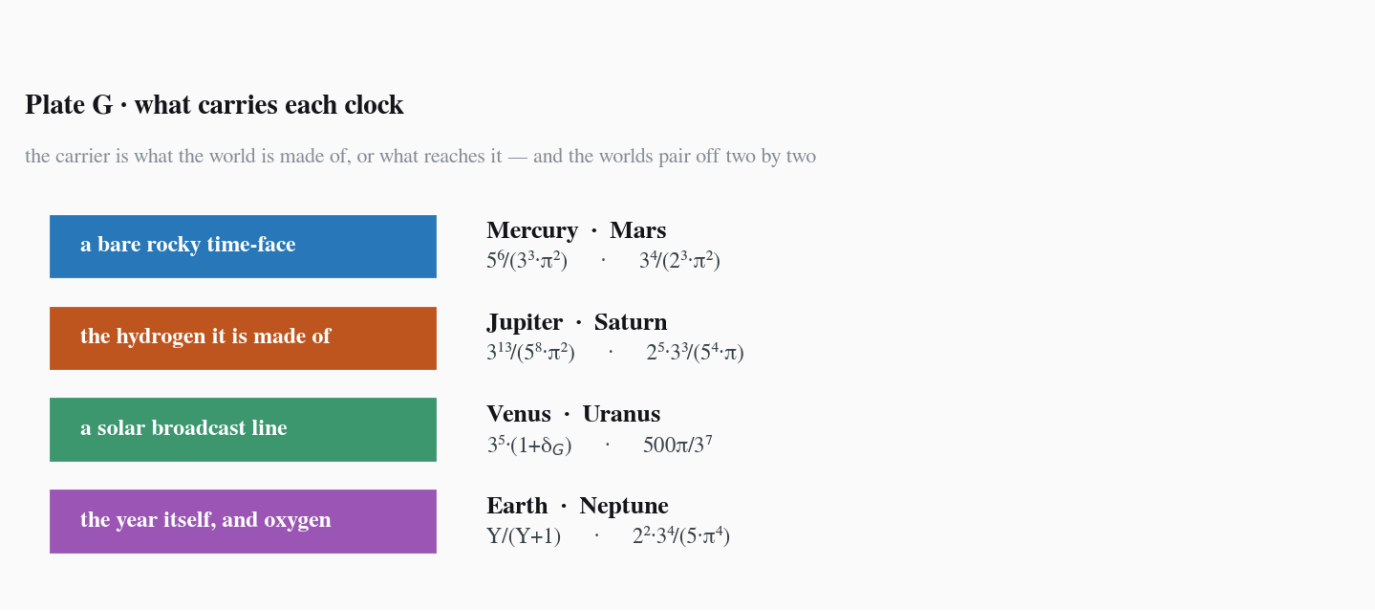


Figure 7 — What carries each clock. The carrier is what the world is made of, or what reaches it. The eight fall into four pairs, and the pairing is not imposed: the two bare stone worlds share a carrier because they are the same kind of thing; the two great hydrogen worlds spin on hydrogen; two worlds keep their clocks on a solar broadcast line; and the Earth and Neptune are joined by the year itself.

Before the eight, one word about how to read them. Each subsection gives the form first, then the arithmetic written out digit by digit, then the value, then the carrier and what it means. **The arithmetic is shown in full and never abbreviated**, so that a reader who disbelieves a result can find the exact step they disbelieve rather than having to take the whole thing or leave it.

10.1 · Mercury — a bare rocky time-face, and the 3:2 lock

Mercury turns once in 58.634944237463988104097 days, and the form is a bare rocky time-face of the shape a_n/π^2.

```
58.6349442374639881041  days   =   5⁶ / (3³ · π²)


    5⁶       =   15,625
    3³       =   27
    π²       =   9.869604401089358618834
    27 · π²  =   266.479318829412682708516

    15,625 / 266.479318829412682708516

             =   58.634944237463988104097   days      THE ROTATION
```

And that is exactly two-thirds of Mercury's own orbit — the famous 3:2 spin-orbit lock, here read off the lattice rather than fitted to a telescope.

```
× 3/2   =   87.952416356195982156145   days          THE ORBIT
```

Crucially, this is **not** two fitted numbers with a ratio imposed on them. On the symbols, $5^6/(3^3\cdot\pi^2) \times 3/2$ is $5^6/(2\cdot3^2\cdot\pi^2)$, one monomial, and the division of one by the other is exact with π cancelling:

```
5⁶/(3³·π²)   ÷   5⁶/(2·3²·π²)   =   2/3          exactly, no residual
```

Settle one and the other is forced. Three turns of the planet for every two trips round the Sun, written into the {2,3,5,π} grid itself rather than observed and then explained.

What is at stake in this world. The 3:2 resonance is the one rotation fact in the solar system that the standard account explains well: tidal capture into a stable resonance is a worked piece of celestial mechanics and nobody needs the lattice for it. The framework's claim is not that the standard explanation is wrong. It is that the resonance is *also* an exponent relation between two addresses, and that the addresses were not chosen to produce it. A reader who finds the dynamical account sufficient should note what section 9.3 does with the same number: multiply the rotation by 3/(2π) and the silicon rung comes back, which tidal capture has no way to arrange.

10.2 · Mars — the same rocky face, one register down

Mars keeps the same kind of clock as Mercury, which is the first structural claim of the section: **the two bare stone worlds share a carrier because they are the same kind of thing.**

```
1.025876984378669935869  days   =   3⁴ / (2³ · π²)


    3⁴       =   81
    2³       =   8
    8 · π²   =   78.956835208714868950672

    81 / 78.956835208714868950672

             =   1.025876984378669935869   days
             =  24.621047625088078460863   hours
```

Read in hours the form simplifies to a shape with nothing but a three and a π in it — **$3^5/\pi^2$** — which is the same rocky time-face wearing the hour rather than the day. The simplification is the unit relabel of section 7.1 doing exactly what it is supposed to do: $24 = 2^3 \cdot 3$, so multiplying $3^4/(2^3 \cdot \pi^2)$ by it cancels the 2^3 and lifts the 3^4 to 3^5.

```
3⁵ / π²   =   243 / 9.869604401089358618834   =   24.621047625088078460863   hours
```

And here is the structural observation. Take the ratio of the two stone worlds' days:

```
Mars  ÷  Mercury   =   3⁴/(2³·π²)  ÷  5⁶/(3³·π²)   =   3⁷ / (2³ · 5⁶)

                   =   2187 / 125000   =   0.017496      exactly
```

The π cancels completely, and what is left is a pure whole-number rational. Section 3.4 is emphatic that a ratio of two monomials is guaranteed to land and is worth nothing as evidence — and that stands. What is not guaranteed, and what carries the information, is that the two addresses carry the *same power of π*. That is the signature of a shared geometry: both worlds are read at the same number of turns down. Jupiter and Mars also share π^{-2}; Saturn and Uranus do not share with them, and their ratios keep a π. **The powers of π sort the eight into geometric classes, and the classes are the carriers of section 10.11.**

10.3 · Venus — the Sun's hydrogen-beta broadcast, halved

Venus is the strangest world in the list observationally and one of the plainest on the lattice. Its clock is the Sun's Hβ carrier, 486, halved and lifted one register step.

```
243.0219065966155567644  days   =   3⁵ · (1 + δ_G)


    3⁵         =   243                     the bare face, and 486 / 2 = 243
    (1 + δ_G)  =   1.000090150603356200676 4828

    243 × 1.000090150603356200676 4828

               =   243.021906596615556764369   days
```

486 is the hydrogen-beta line in nanometres — the same line that bends starlight and unfolds the visible spectrum. Venus turns at half the Sun's broadcast, one step up the register staircase.

Three things about this world deserve saying plainly, because Venus is where a sceptical reader will press hardest.

The bare face is $3^5 = 243$ exactly, a whole number of days. Venus's rotation is recorded at close to 243 days. That a planet's rotation should be a small whole number of another planet's days is either a coincidence of remarkable size or it is the register showing. The framework says the second, and the way it says it is testable: not "about 243", but **$243 \times (1 + \delta_G)$**, with δ_G a step fixed in hydrogen years before Venus was considered.

The backwards turning is not what the magnitude is doing. Venus's retrograde rotation is a fact about orientation — which way the axis points — and the framework's account here is of magnitude only. Nothing in $3^5 \cdot (1+\delta_G)$ predicts or explains the sign, and the paper does not pretend otherwise. Section 17 lists it as open.

Venus is the world where the inverse was worked, and where the notes were wrong. Section 9.2 gives it in full. The de-projection lands on $27 \cdot (1+\delta_G)$ rather than the 27 the working notes recorded, and the difference is the same step again, carried faithfully through the inverse. The correction is not cosmetic: a framework that reported the landing as "27 exactly" would be rounding away the one feature that distinguishes Venus from the bare face.

10.4 · The Earth — its own year, folded once

The Earth's day was hiding inside the Earth's year, and the fold is a single step of ordinary reasoning about turning and circling.

> the sidereal year = $15\pi^4/4$ = 365.284091377509139636651 days

A planet that turns once a day and circles once a year **makes exactly one extra turn against the stars in the course of that year.** So the day is the year divided by year-plus-one:

> 365.284091377509139636651 / 366.284091377509139636651
>
> = 0.997269878699237979581 days
> = 23.934477088781711509934 hours
> = 23 h 56 m 04.117519614 s

Nothing was fitted. The day fell out of the year by a single fold, and the year itself is $15\pi^4/4$, a lattice value fixed elsewhere in the framework and not introduced here.

And this is the one world in the eight whose day is not a monomial, which matters enough to state as a caution rather than leave for a reader to discover. The expression Y/(Y+1) contains an addition. Section 3.4 says that no additive quantity is expected to land on the lattice, and this one does not: the Earth's day has no address of the form 2^a·3^b·5^c·π^d, and the framework does not claim one for it.

Why is the addition legitimate here when it is forbidden elsewhere? Because **the addition is the physical operation, not an arithmetical convenience.** The extra turn is a real turn: it is the difference between a solar day and a sidereal day, and it is added because the planet really does make one more rotation against the stars than it makes against the Sun. The framework's rule is not "never add"; it is "never expect a sum to land, and never present one as if it had landed". The Earth's day is presented here as what it is — a fold of a lattice value, exact in its own terms, and not itself an address.

This has a consequence that section 11 collects: **the Earth is a poor reference world.** Any gear computed against the Earth's day inherits the Earth's non-monomial character and will not be a lattice object, however clean the numerator is. A framework that had chosen its reference for convenience would have chosen better; this one is stuck with the Earth because that is where the observations are taken from.

10.5 · Jupiter — the hydrogen world, on hydrogen

Jupiter is largely hydrogen, and it keeps its clock on hydrogen. The plainest statement of it is a pure monomial with no decimal anywhere:

```
0.4135390552785993799212  days   =   3¹³ / (5⁸ · π²)


    3¹³      =   1,594,323
    5⁸       =   390,625
    3¹³/5⁸   =   4.08146688                  exactly, a terminating decimal
    ÷ π²     =   0.413539055278599379921     days
    × 24     =   9.924937326686385118109     hours
```

The intermediate 4.08146688 is worth pausing on: it terminates, and it terminates because a denominator of 5^8 alone always does. There is no rounding anywhere in the route; the only irrational thing in it is π.

And the same value written through hydrogen's own ionisation unit shows why it is called a hydrogen clock. With H = 13.6048896 eV = $2^8 \cdot 3^{12} \times 10^{-7}$:

```
H · 3 / (2 · 5 · π²)   =   0.413539055278599379921   days      identical
```

The two are the same object: substituting $2^8 \cdot 3^{12} \times 10^{-7}$ for H and clearing the powers of ten gives $3^{13}/(5^8 \cdot \pi^2)$ exactly. **The ionisation unit of the hydrogen atom, written into a day.** Ten is 2·5 and is inside the alphabet, so the power of ten costs nothing and the two forms are the same address.

> **A correction carried here.** Chapter 40 of the main work prints this form as $H \cdot 3^4/(2^2 \cdot 5 \cdot \pi^2)$, which evaluates to 5.5827772462610916289 — **twenty-seven halves of the value standing beside it.** Chapters 48 and 49 carry the correct $H \cdot 3/(2 \cdot 5 \cdot \pi^2)$. The pure monomial $3^{13}/(5^8 \cdot \pi^2)$ given above supersedes both, being free of any decimal input, and is the form to quote.

10.6 · Saturn — hydrogen too, on the 864 register, and a second face

Saturn's ground face sits on the day-node 864 = $2^5 \cdot 3^3$, over 5^4 and a π.

```
0.4400315866604722243338  days   =   2⁵ · 3³ / (5⁴ · π)


    2⁵·3³    =   864
    5⁴       =   625
    625 · π  =   1963.495408493620774039

    864 / 1963.495408493620774039

             =   0.440031586660472224334   days      THE GROUND FACE
             =  10.560758079851333384013   hours
```

Saturn is the only one of the eight to carry a single power of π rather than two or four. That is not a blemish; it is the statement that Saturn is read one turn down rather than two, and it is why Saturn's ratios against the π^{-2} worlds keep a π in them.

And Saturn keeps a second face one helical turn above the ground face, r being the same helical turn that sets the twist of DNA:

```
× r   =   × 1.00469393004115226337449

      =   0.442097064144153710469   days              THE TURNED FACE
      =  10.610329539459689051257   hours
```

10.7 · Uranus — the Balmer edge, and a second face one register step above

Uranus sits on 500π over 3^7, and 3^7 = 2187 is the Balmer edge in the denominator.

```
0.7182424905326459164295  days   =   500 · π / 3⁷


    500 · π  =   1570.796326794896619231
    3⁷       =   2187

    1570.796326794896619231 / 2187

             =   0.718242490532645916430   days      THE GROUND FACE
             =  17.237819772783501994321   hours

× (1 + δ_G)

             =   0.718307240526523494711   days      ONE REGISTER STEP ABOVE
             =  17.239373772636563872666   hours
```

Note that 500 = 2²·5³, so the address in full is 2²·5³·π/3⁷ — the only one of the eight to carry π in the numerator rather than the denominator. Uranus is read one turn *up*, not down, and it is the outlier of the set in that respect.

10.8 · Neptune — oxygen, and the road home to the Earth's year

Neptune keeps its clock on oxygen, and this is the one world whose carrier reaches back and touches another world's number.

```
0.6652356501035449202571  days   =   2² · 3⁴ / (5 · π⁴)


    2²·3⁴    =   324
    π⁴       =   97.409091034002437236
    5 · π⁴   =   487.045455170012186181

    324 / 487.045455170012186181

             =   0.665235650103544920257   days
             =  15.965655602485078086170   hours    oxygen's own node
```

In hours the address is 2⁵·3⁵/(5·π⁴), and the two forms differ by the relabel 24 = 2³·3, as they must. Both are on the lattice; neither is more fundamental than the other.

And the oxygen node reaches back and touches the Earth's year. Neptune's day carries π⁻⁴; the Earth's sidereal year, 15π⁴/4, carries π⁺⁴. They are eight turns of π apart, and when the two are multiplied together the π vanishes entirely:

```
Neptune's day  ×  the Earth's year

    =   [ 2²·3⁴ / (5·π⁴) ]  ×  [ 15·π⁴ / 4 ]

    =   (324 × 15) / (5 × 4)

    =   4860 / 20     =     243     =     3⁵          exactly
```

Verified symbolically: the product reduces to the integer 243 with no remainder of any kind. **The outermost planet's day multiplied by our own year is three to the fifth — which is Venus's bare face.** Three worlds, taken from three unrelated carriers — oxygen, the Earth's orbit, and the Sun's hydrogen-beta line — close on one small integer.

A careful reader should hold this at exactly the weight it deserves, and no more. That the product of two monomials is a monomial is guaranteed and worth nothing (section 3.4). What is *not* guaranteed is that the product should be a **small whole number**, and that the small whole number should be the bare face of a third world fixed independently. There are a great many monomials; there are very few that are 243. That is the claim, and it is checkable in one line.

10.9 · Two-face worlds, and why this is a prediction rather than a hedge

Saturn and Uranus are the only two of the eight that keep two clean faces. In each case **the recorded rotation lies between the two faces**, and the framework's statement is that this is precisely why neither has ever been pinned

in the literature to better than about a part in a thousand.

WORLD	GROUND FACE	SECOND FACE	SEPARATED BY
Saturn	0.440031586660472224334	0.442097064144153710469	one helical turn r
Uranus	0.718242490532645916430	0.718307240526523494711	one register step δ_G

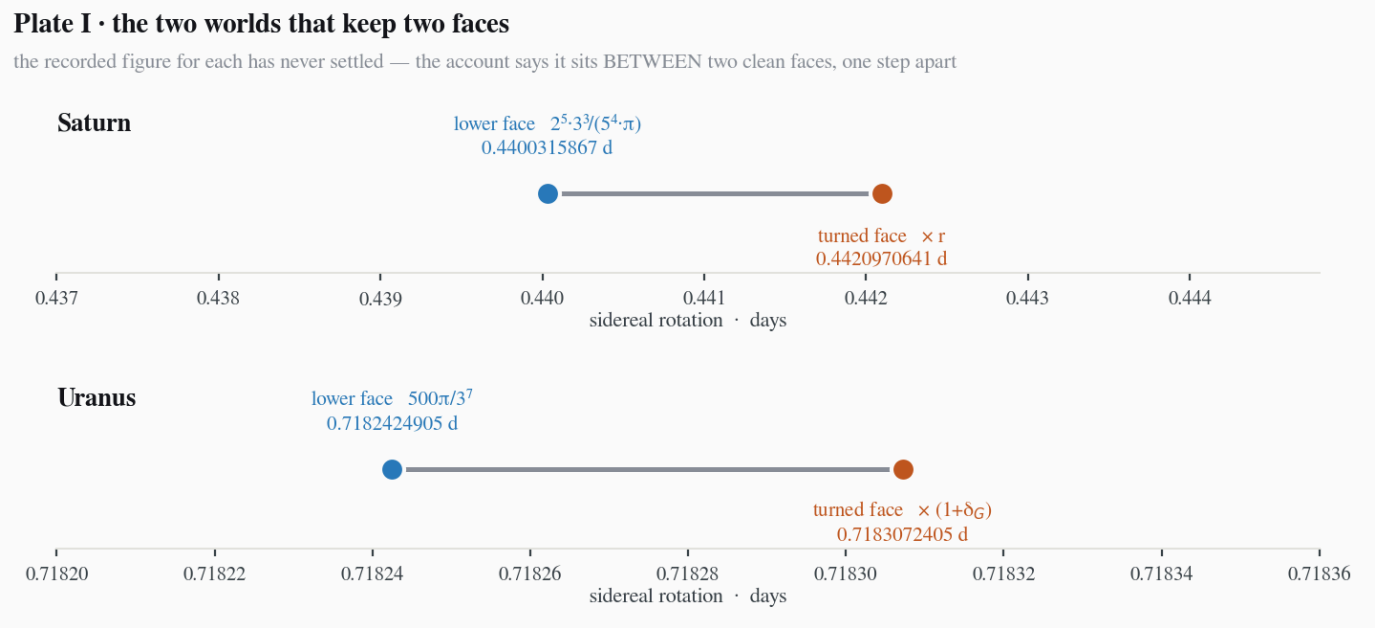


Figure 8 — The two worlds that keep two faces. For each, the ground face and the turned face are shown at full precision on an axis fine enough to separate them. Saturn's two faces are one helical turn apart — a wide bracket, about five minutes of rotation. Uranus's are one register step apart — a narrow bracket, about six seconds. The account says the recorded value must fall inside its own bracket, and can be wrong.

This is a bracket, not a fudge, and the distinction is worth being explicit about because it is the one a hostile reader will reach for first. A hedge widens to accommodate whatever arrives: it has no edges and cannot be violated. A bracket has two edges, both fixed in advance by steps that were determined elsewhere, and it says where the answer must fall. If either world's rotation settles outside its two faces — above Saturn's turned face, or below its ground face, or outside Uranus's much narrower pair — **the reading is refuted at that world**, and section 15 lists it among the six conditions that would kill the account.

It is also, and this is the part worth testing rather than arguing about, **an explanation of a real and current disagreement.** Saturn's rotation period has been revised more than once as different methods — magnetic field periodicities, radio emissions, ring seismology — have returned different answers spread across several minutes. Uranus's is known no better. The framework's position is that this is not instrumental failure but structure: **the planet has two faces and the measurement is sampling between them**, and which face a method returns should depend on which layer of the planet the method couples to.

10.10 · The eight together

WORLD	FORM	EXACT VALUE		CARRIER
Mercury	$5^6/(3^3\cdot\pi^2)$	58.634944237463988104097	d	a bare rocky time-face
its orbit	$5^6/(2\cdot3^2\cdot\pi^2)$	87.952416356195982156145	d	the 3:2 lock, exact
Venus	$3^5\cdot(1+\delta_G)$	243.021906596615556764369	d	the Sun's Hβ, halved
Earth	$Y/(Y+1)$	0.997269878699237979581	d	its own year, folded once
the year	$15\pi^4/4$	365.284091377509139636651	d	
Mars	$3^4/(2^3\cdot\pi^2)$	1.025876984378669935869	d	the same rocky face
Jupiter	$3^{13}/(5^8\cdot\pi^2)$	0.413539055278599379921	d	hydrogen
Saturn	$2^5\cdot3^3/(5^4\cdot\pi)$	0.440031586660472224334	d	hydrogen, 864 register
turned	$\times\ r$	0.442097064144153710469	d	
Uranus	$2^2\cdot5^3\cdot\pi/3^7$	0.718242490532645916430	d	the Balmer edge, 3^7
one step	$\times\ (1+\delta_G)$	0.718307240526523494711	d	
Neptune	$2^2\cdot3^4/(5\cdot\pi^4)$	0.665235650103544920257	d	oxygen → the Earth's year

Plate J · the whole account, as integers

six of the eight rotations reduce, in days, to whole-number exponents of 2, 3, 5 and π; the two that do not are named beside their row

	the exponent of 2	3	5	π	
Mercury	0	-3	+6	-2	
Venus	0	+5	0	0	$\times(1+\delta_G)$
Earth					$Y/(Y+1),\ \ Y=15\pi^4/4$
Mars	-3	+4	0	-2	
Jupiter	0	+13	-8	-2	
Saturn	+5	+3	-4	-1	
Uranus	+2	-7	+3	+1	
Neptune	+2	+4	-1	-4	

Figure 9 — The whole account, as integers. Every rotation reduced to the exponents of two, three, five and π. Six of the eight are a bare monomial in days. Venus carries one register step and the Earth's day is a fold rather than an address; both are named beside their rows. Nothing else appears in any cell — no seven, no eleven, no thirteen, and no fitted decimal anywhere in the table.

There is no leftover world, no soft case, and no day left waving through. The inner four run on rock and the Sun's hydrogen; the outer four on hydrogen, the Balmer edge, oxygen and the year itself. Six of the eight sit directly on their lattice value; two sit between two faces one fixed step apart.

10.11 · What the eight have in common, and what they do not

Three patterns run through the table, and one expected pattern is absent. All four observations are worth stating, because the absent one is as informative as the others.

The power of π sorts the worlds into classes. Mercury, Mars and Jupiter all carry π^{-2}; Saturn carries π^{-1}; Uranus carries π^{+1}; Neptune and the Earth's year carry π^{-4} and π^{+4}. The π exponent is the number of turns between the world's register and the reading register, and worlds that share it share a geometry. Within a class the ratios are pure rationals — Mars over Mercury is 2187/125000 with no π at all.

The carrier is the composition. The two bare stone worlds keep a rocky time-face. The two great hydrogen worlds keep hydrogen. Neptune keeps oxygen. Venus and Uranus keep spectral lines of hydrogen — the β line and the Balmer edge. **Nothing in the framework requires this**, and it would have been perfectly consistent with everything in Parts Two and Three for the carriers to be assigned at random. They are not assigned at random, and section 16.3 takes seriously the objection that they were assigned after the fact.

Six of eight need no mover at all. Section 3.6 permits two displacements and no more. Six worlds use neither, one uses δ_G, one uses r, and one — Uranus — uses δ_G on its second face only. If the account were being propped up, the movers would be everywhere.

And what is absent: there is no ordering by distance. The addresses do not climb outward from the Sun, and no arrangement of them does. That is the subject of the next section, and it is the single commonest way this material is misread.

PART FIVE — WHAT THE ACCOUNT IS NOT

11 · Two axes, and the commonest way to misread the days

A reader who has followed section 10 may reasonably ask why, if the days are ordered, they do not *look* ordered — why the gears do not climb steadily outward from the Sun. The answer is that **two different quantities are being confused, and the framework's own working did not until now separate them.**

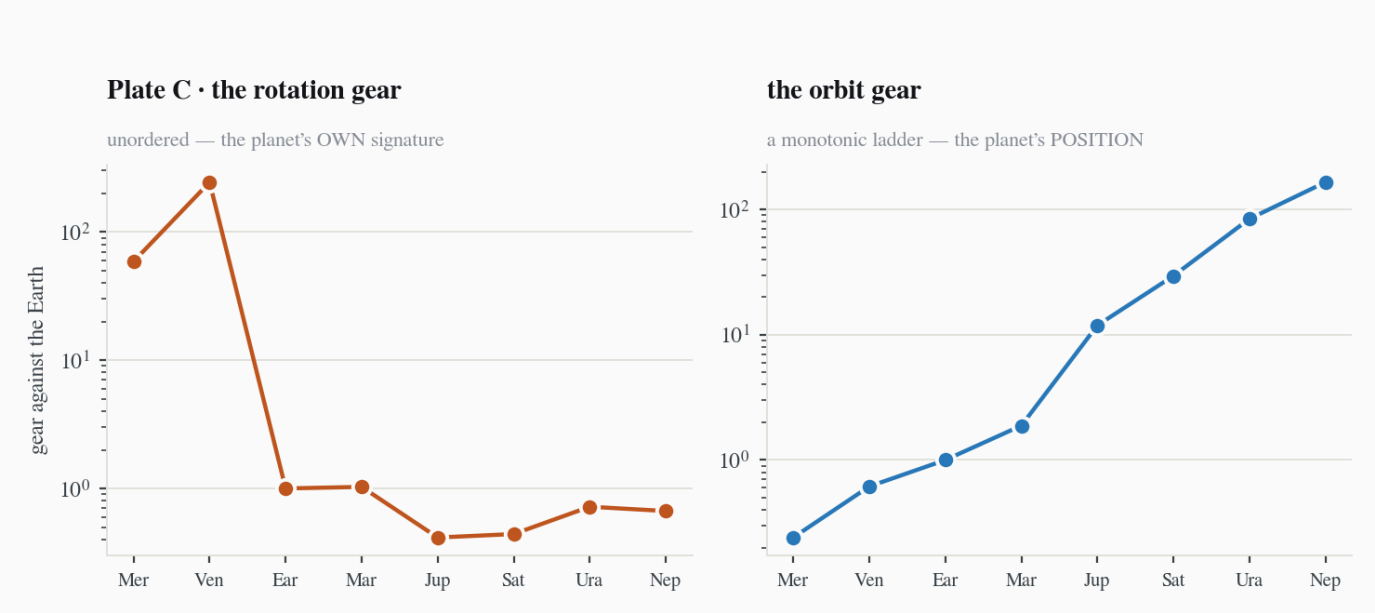


Figure 10 — Two axes, not one. Left: the rotation gear against the Earth's turn — unordered, because it is the planet's own local signature. Right: the orbit gear against the Earth's year — a monotonic ladder in distance, because it is the planet's position in the Sun's field. Looking for one ordering across both is looking for something that is not there.

```
WORLD      ROTATION GEAR vs the Earth's turn   ORBIT GEAR vs the Earth's year

Mercury           58.795462983343                    0.24080
Venus            243.687202218114                    0.61508
Earth              1                                 1
Mars               1.028685420357                    1.88050
Jupiter            0.414671157839                   11.85981
Saturn             0.441236215050                   29.45173
Uranus             0.720208747776                   84.00512
Neptune            0.667056796071                  164.73911

SCATTERED — the planet's OWN signature      A LADDER — the planet's POSITION,
                                             going as distance^1.5, which is Kepler
```

The rotation gear is what the world is. The orbit gear is where the world is. Two quantities, two axes, and no reason on earth why one should sort the other.

Two consequences follow, and a withdrawal.

First: no account of the days should expect them to sort by distance, and one that produces such a sorting has almost certainly fitted it. The rotation gears in the left column are in no order at all with respect to the Sun —

Jupiter is the fastest and it sits fifth out; Venus is the slowest and it sits second. If the days were set by position, that column would climb, and it does not.

Second: the rotation gear against the Earth is not itself a lattice object, and cannot be. This follows directly from section 10.4. The Earth's day is Y/(Y+1), which contains an addition and therefore has no address. Divide any monomial by a non-monomial and the result is a non-monomial. **Every number in that left column is a ratio to a quantity that is not on the lattice**, and so none of them is on it either. The scatter in the left column is partly the worlds' own signatures and partly the Earth's awkwardness as a ruler.

> **A withdrawal, recorded here rather than quietly dropped.** An earlier working of this table computed the rotation gears against an incorrect figure for the Earth's rotation in hours — 23.5641 h in place of the correct 23.934477088782 h — and on that erroneous denominator Mercury's rotation gear came out at 59.719680, which was then remarked on as being the Earth's mass times ten to within a small part. **That remark is withdrawn.** It was an artefact of the wrong denominator. Mercury's rotation gear against the corrected Earth day is 58.795462983343, and no such reading of it is offered. The error and its consequence are recorded in the correction register rather than corrected in silence, because a reader who has seen the earlier figure is entitled to know what happened to it.

The withdrawal is worth one further sentence. It is exactly the kind of thing that section 4's arithmetic conventions exist to catch, and it was caught by recomputing every figure from its route rather than carrying a decimal forward. **A number that has been carried rather than derived is a number that has not been checked.**

12 · The control, and it is a negative

This section reports a failure. It is here because a framework that hides its negatives has not earned its positives.

The natural next move after section 10 is to ask whether the *orbital* periods also sit on the lattice. They were tested the same way, and they do not.

12.1 · How the test was run

The method matters, so it is stated before the result.

A blind search takes an observed period and looks for whole-number exponents a, b, c, d, with a free power of ten, such that 2^a·3^b·5^c·π^d comes as close to it as possible. The search is blind in the sense that **it is not told what the answer should be and is given no route**: it is pure exponent hunting, which section 3.4 says is a fit and not a route, and which therefore has no evidential value on its own.

What gives it value is the null. **Forty periods were generated at random over the same range and put through the same search.** If the real orbits are on the lattice in any meaningful sense, they must fit better than randomly chosen numbers do. If they fit no better, then whatever the search found for them, it would have found for anything.

12.2 · The result

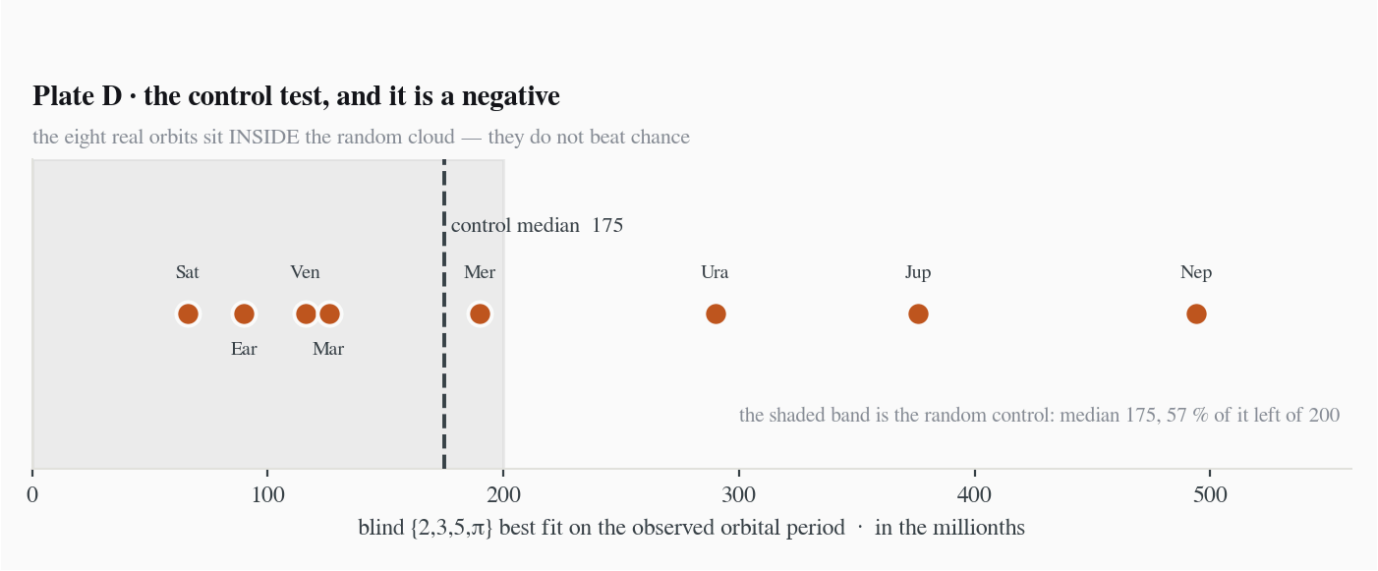


Figure 11 — The control test. A blind {2,3,5,π} search on the eight recorded orbital periods returns best fits from 66 to 494 in the millionths. A control of forty random periods over the same range, run through the same search, returns a median of 175 with 57 per cent of the control landing below 200. The eight real orbits sit inside the random cloud.

```
THE EIGHT REAL ORBITS, blind best fit, in the millionths

  Saturn  66     Earth  90     Venus 116     Mars 126
  Mercury 190    Uranus 290    Jupiter 376   Neptune 494

THE CONTROL — forty random periods, same range, same search

  median 175 · 57 per cent below 200

VERDICT:  the real orbits do not beat chance.
```

Four of the eight real orbits land better than the control median; four land worse. That is what a null result looks like. Semi-major axes in astronomical units behave the same way, blind-fitting only to two hundred and seven hundred in the millionths.

By contrast the rotations carry a signal that is a different order of thing entirely — nought to five in the millionths against the framework's own values, which is to say they agree to five or six figures where the orbits agree to three. But the honest statement of that contrast has to include the fact that the rotations were *routed* and the orbits were *searched*, and those are not the same operation. The control tells you what searching is worth. It says: not much.

12.3 · Why the orbits fail, and why that is not a defeat

The reason is not a failure of the lattice but a fact about what an orbit is. **The orbit is Kepler-locked to distance**, T ∝ d^1.5, so it inherits the distance's lattice status and carries no independent identity of its own. Asking whether an orbital period is a lattice node is asking a question about the distance in disguise — and if the distance is not itself routed, the question has no content.

The clean lattice therefore lives in two places: **the spin**, which section 10 works, and **a distance derived on principle** — as the Mars work does, arriving at 375/π² rather than fitting a period. It does not live in a blind period search, and the control is what tells you so.

> **Standing ruling from this result. Blind orbit nodes are not to be presented as clean. The control forbids it.** Where an orbital period is quoted in this framework, it must come from a principled distance through Kepler, not from a search.

12.4 · What the control protects

Any framework with a dense enough alphabet can hit a target. The lattice {2,3,5,π} with a free power of ten is dense, and something is always nearby. **The control is the only instrument that separates a finding from an inevitability.**

It is also the answer to the objection of section 16.2, and the reason that objection can be answered at all. Without a null, "the rotations land on the lattice" is a sentence with no content, because everything lands on the lattice if you look hard enough. With a null, the sentence acquires a meaning: the rotations land better than random numbers do, and the orbits do not. **One of those is a result and the other is a negative, and the framework is obliged to report both.**

13 · The pure-distance equalisation

A second equalisation runs alongside the first, and it concerns position rather than turning. It is included because it is the part of the account that is *not* about the days, and because it is where Kepler's third law turns up as a remainder.

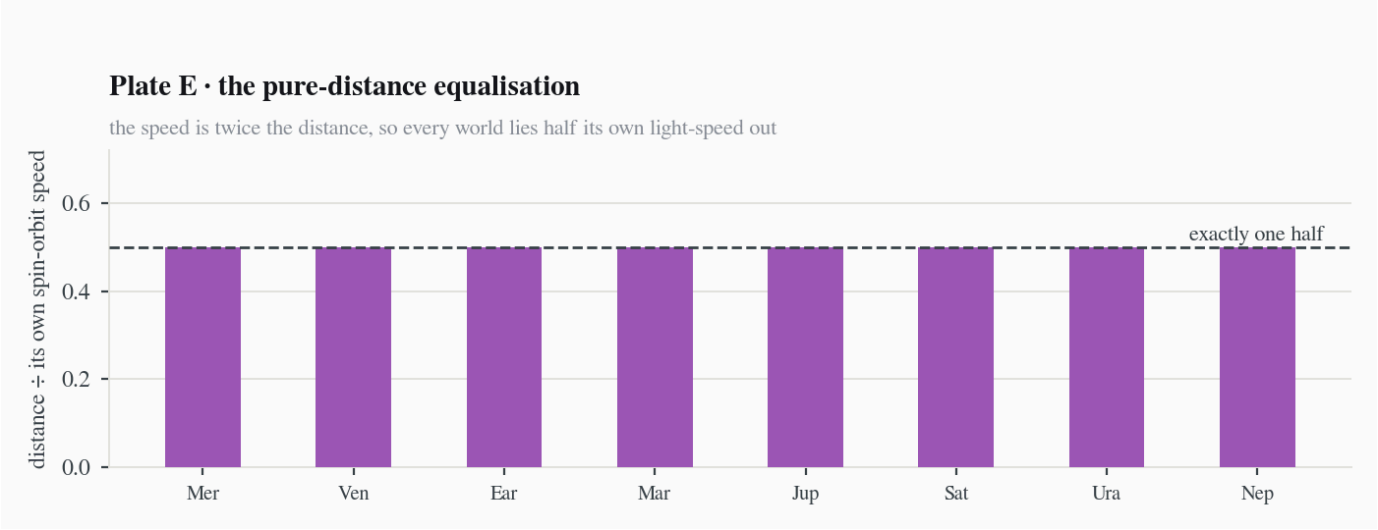


Figure 12 — The pure-distance law. The dimensional spin-orbit speed of a planet — its local light-speed — is twice its distance from the Sun. Because the distance sits inside the speed, the ratio between them is fixed for every world.

The statement. The dimensional spin-orbit speed of a planet is **two times the distance between the Sun and that planet**. The Earth at 150 million kilometres carries a speed of 300 — that is, 300,000 km/s. Mercury at 57.9 carries 115.8.

```
distance ÷ its own spin-orbit speed   =   1/2      exactly, all eight worlds
```

Every world lies exactly half its own light-speed out from the Sun. **Where-it-is against how-fast-its-light-runs is a fixed one-to-two across the whole system**, and it matches the framework's dimensional spin-orbit speeds independently: the Sun 25/18, Mercury 125/108, Venus 54/25, the Earth 3 — each of them twice the distance in millions of kilometres over a hundred, which is three times the distance in astronomical units.

A reader will notice at once that a law of the form "speed equals twice distance" makes the ratio trivially one half, and will want to know where the content is. It is a fair challenge, and the answer is that **the content is in the claim that the speed is local at all.** In the standard picture the speed of light is one number everywhere and a planet's distance has nothing to do with it; the ratio distance-to-speed then varies by a factor of eighty across the system. The framework's claim is that the speed is a local property that scales with position — and *given* that claim, the constancy of the ratio is indeed trivial, in the same way that the d^2 cancellation is trivial once the coupling claim is granted. The non-trivial part is always the physical assertion, never the algebra that follows from it.

13.1 · And the residual is Kepler

Now rerun each orbital period at the Earth's speed — that is, ask how long each orbit would take if every world's light ran at ours. **It does not go flat.** It climbs as the square root of distance:

```
228 · 312 · 365 · 451 · 833 · 1128 · 1599 · 2002        days
```

That is a clean √d sitting on top of a pure distance traversal, which goes as d^1. **And that extra square root is Kepler's third law, laid bare as a geometric remainder rather than assumed as an empirical law.** Distance equalises perfectly at one half; the orbital period carries one extra √d; and the √d *is* Kepler.

So the two equalisations divide the work cleanly, and the division is the tidiest summary the paper can offer of what it has and has not shown:

```
ROTATION    one turn of T × a {2,3,5,π} gear          what the world IS
DISTANCE    a fixed 1 : 2 against its own light        where the world IS
ORBIT       the distance traversal × √d                and the √d is Kepler
```

PART SIX — THE CLAIMS

14 · The propositions

Collected so they can be cited and attacked individually.

P-TEQ-1. T propagates spherically from the solar core. At distance d its surface density is $T\odot/(4\pi d^2)$. This is the starting condition for celestial equalization.
P-TEQ-2. Planetary nodal coupling grows as d^2. Each planetary node subtends a T-receiving cross-section proportional to $4\pi d^2$ — a fixed geometric property of its position, not an adjustment.
P-TEQ-10. The d^2 cancellation. $T_{recv} = [T\odot/(4\pi d^2)] \times [4\pi d^2] = T\odot$, exact for all d, prior to any mechanism. Every planet receives the whole solar T regardless of orbit.
P-DS-INV. The T-source dimensional invariant. $T\odot(n) \times \Xi_n = R\odot$, constant at every dimensional register, without approximation. The Sun never becomes effectively smaller to any node.
P-TEQ-GEN. The general form of the law. For a source spread over a geometry A(x) and received by a coupling C(x), the received quantity is constant in x if and only if $C \propto A$. The exponent is set by the geometry and is not part of the law: two in spherical spreading, two in the discrete shell register, one in cylindrical spreading.
P-TEQ-ROT-1. $T_{observed}(B \mid A) = T_\tau \cdot G$, where T_τ is the frequency constant — one turn of T, identical for every body — and G is a pure {2,3,5,π} register gear. Every observed period is therefore one constant times a lattice number.
P-TEQ-ROT-1i. The inverse. $T_{node}(B) = T_{observed}(B) \cdot F_B$ with F_B built from {2,3,5,π} and fixed in advance. The de-projection must return a lattice node, or the claim fails at that world.
P-TEQ-EQ-1. The true time equalization equation. $1 \div D = 1 \div P_{rotation} - 1 \div P_{orbit}$, or $D = P_{rotation} \times P_{orbit} \div (P_{orbit} - P_{rotation})$. A world's rotation and its orbit are one amount of time, and they meet in the Sun's day D.
P-TEQ-EQ-2. The Earth. 0.997269878699237979581 days and 365.284091377509139636651 days give D = 1 day exactly; 366.284091377509139636651 turns against the stars and 365.284091377509139636651 days against the Sun are the same year ($15\pi^4/4$).
P-TEQ-EQ-3. Mercury. 58.634944237463988104097 days and 87.952416356195982156145 days give D = 175.9048327123919643122 91 days = $5^6/(3^2 \cdot \pi^2)$: three rotations, two orbits and one day of Mercury are one length of time and one lattice address.
P-TEQ-ROT-2. All eight worlds resolve, each through its own physically named carrier. Mercury $5^6/(3^3 \cdot \pi^2)$, exactly two-thirds of its orbit $5^6/(2 \cdot 3^2 \cdot \pi^2)$. Venus $3^5 \cdot (1+\delta_G)$, the Hβ carrier halved. The Earth, its year folded once, Y/(Y+1) with the year $15\pi^4/4$. Mars $3^4/(2^3 \cdot \pi^2)$, the rocky face. Jupiter $3^{13}/(5^8 \cdot \pi^2)$, hydrogen. Saturn $2^5 \cdot 3^3/(5^4 \cdot \pi)$ with a turned face one helical turn above. Uranus $2^2 \cdot 5^3 \cdot \pi/3^7$ with a second face one δ_G step above, the recorded value between. Neptune $2^2 \cdot 3^4/(5 \cdot \pi^4)$, oxygen.
P-TEQ-ROT-2a. The mover restriction. A world's clock sits on its lattice value, or one register step δ_G from it, or one helical turn r from it. No third displacement is admitted anywhere in the account.
P-TEQ-ROT-2b. The π-class. The power of π in a world's address is the number of turns between its register and the reading register. Worlds sharing that power share a geometry, and their ratios are pure rationals with π absent.
P-TEQ-ROT-2c. The Neptune–Earth closure. Neptune's day multiplied by the Earth's sidereal year is exactly 3^5, which is Venus's bare face. Three carriers fixed independently close on one small integer.

> **P-TEQ-ROT-3.** The two axes. The rotation gear is the world's own local signature and is not ordered by distance; the orbit gear is the world's position in the Sun's field and is monotonic in distance as d^1.5.
> **P-TEQ-ORB-1.** Negative result, and standing. The recorded orbital periods do not beat a randomised control under blind lattice search. The orbit is Kepler-locked to distance and carries no independent lattice identity. Blind orbit nodes are not to be presented as clean.
> **P-TEQ-DIST-1.** The dimensional spin-orbit speed of a planet is twice its distance from the Sun, so distance ÷ speed = 1/2 exactly for all eight worlds. Rerunning the orbit at a common speed leaves a residual √d, and that residual is Kepler's third law.

15 · What would kill this

A framework earns its claims by naming what refutes them. Six conditions, each answerable with existing or near-term measurement, and each stated so that a reader can go and check rather than take a view.

One — a world off the lattice. A planetary rotation that cannot be written as T_τ times a {2,3,5,π} gear with small exponents. The exponents must be fixed before the arithmetic; a landing reached only by large exponents is a fit and is not admitted. **One world off the lattice ends the claim.**

Two — a two-face world settling outside its bracket. Section 10.9 gives Saturn between 0.440031586660472224334 and 0.442097064144153710469 days, and Uranus between 0.718242490532645916430 and 0.718307240526523494711. A modern determination landing **outside** either bracket refutes the two-face reading at that world. This is the most immediately testable of the five: both quantities are under active measurement now.

Three — the inverse failing. If T_observed × F_B lands off the lattice for any world, with F_B fixed in advance, the de-projection is broken and the formula with it. This is the sharpest of the five because it cannot be repaired by a better gear: **the gear and its inverse are the same object**, and a repair to one damages the other.

Four — the distance ratio departing from one half. Section 13 predicts distance ÷ spin-orbit speed = 1/2 for every world. Any world departing from it refutes the pure-distance law.

Five — no restoring bias in the inclinations. The equalized sheet predicts **bounded oscillation about the plane**, not the unbounded slow drift a formation-relic picture permits. An inclination distribution with no restoring tendency toward zero refutes the physical mechanism even if the arithmetic survives.

Six — the day off the lattice. Wherever a world's rotation and orbit are both fixed on the lattice, the true time equalization equation must return a day that is itself a lattice value, as it does for the Earth (1) and for Mercury ($175.904832712391964312291 = 5^6/(3^2 \cdot \pi^2)$). A world whose two fixed clocks give a day with no address refutes P-TEQ-EQ-1.

A seventh condition is worth naming although it is not a measurement: **if a route in this paper is found to have been fixed after its target was known**, that route is void regardless of how well it lands. The framework keeps a dated register precisely so that this can be checked rather than asserted.

16 · Objections, taken at their strongest

Six objections. Two of them are not answered, and are marked as such.

16.1 · "The d² cancellation is trivial"

It is flux conservation for a point source, true in any inverse-square theory, and dressing it in new words adds nothing.

The algebra is trivial and the paper does not pretend otherwise. **The physics it stands on is not.** What science calls gravity does not assign each planet a T-receiving cross-section that grows as $4\pi d^2$. This framework does, and it is the pairing of that growing sphere with the falling flux that gives the cancellation content: **every world receives the same total T — an equalized clock, not merely a conserved flux through a closed surface.** The physical claim is the T-sphere; the algebra only records it. A reader who rejects the T-sphere should reject the conclusion, and should say so at that point rather than at the algebra.

16.2 · "The lattice is dense enough to hit anything"

With four generators, whole-number exponents of either sign and a free power of ten, something is always nearby. Landing means nothing.

This objection can be answered by counting rather than by assertion, and the counting was done.

Take the range this paper works in — values from about 0.09 to 330, which covers every rotation in days from Jupiter's to Venus's. Enumerate every address 2^a·3^b·5^c·π^d whose exponents lie within a bound, and ask what fraction of randomly chosen targets in that range have an address within a given relative distance.

EXPONENT BOUND	ADDRESSES IN RANGE	WITHIN 1 IN 10^5	WITHIN 1 IN 10^6
all |exponents| ≤ 4	3,045	0.65 %	0.07 %
all |exponents| ≤ 6	9,565	2.20 %	0.38 %
all |exponents| ≤ 8	21,715	5.28 %	0.70 %
all |exponents| ≤ 10	41,297	10.15 %	1.12 %
all |exponents| ≤ 13	88,248	21.85 %	2.23 %

(Four thousand random targets per row, drawn uniformly in log over the range.)

The lattice is sparse, and it is sparse in exactly the way that matters. At the exponent sizes this paper actually uses, a randomly chosen number has roughly a one-in-twenty chance of having an address within one part in a hundred thousand, and roughly a one-in-a-hundred-and-forty chance within one part in a million. It is not true that something is always nearby.

Two qualifications, both against the framework's interest. **First, the density rises steeply with the exponent bound**, which is why the framework's rule that large exponents are a fit and not a finding is not fastidiousness but necessity. Seven of the eight worlds sit inside a bound of seven; Jupiter's $3^{13}/5^8$ does not, and a reader is entitled to weigh Jupiter accordingly — though it is worth noting that $3^{13}/5^8$ terminates as an exact decimal, 4.08146688, which is a stronger constraint than the bound alone conveys. **Second, this counting bears on the sparseness of the lattice and not on the routes.** A route that was chosen after its target was known is worthless however sparse the lattice is. The counting answers the density objection; it does not answer section 16.3.

16.3 · "The carriers were chosen after the fact to fit eight numbers"

Rock for two, hydrogen for two, oxygen for one, the Balmer edge for one, its own year for one — a menu wide enough to cover anything.

This is the strongest objection in the paper and it is not fully answered.

What can be said: the carriers are not free-floating. Each is the world's **dominant physical constituent or its nearest structural tie**, named independently of its rotation — Jupiter and Saturn are hydrogen worlds on any account, Neptune's chemistry is what it is, and the Earth's tie to its own year is a geometric identity rather than a choice. The pairing of section 10.11 is also a constraint that was not sought: the eight fall into four pairs by carrier, and worlds that share a carrier share a power of π.

What cannot yet be said: **that a single operator predicts which carrier a world must use before its day is known.** There is no such operator in this paper and none in the framework. Until there is, a reader is entitled to hold that eight carriers over eight worlds is not a strong constraint.

That gap is stated here rather than papered over, and it is the most valuable open problem in the topic.

16.4 · "π and the primes cannot form a lattice"

Two, three and five are primes; π is transcendental. Mixing them is not a lattice in any recognised sense, and unique factorisation — the thing that makes an "address" mean anything — has no reason to hold.

This objection is answerable and the answer is in the framework's favour.

Unique factorisation does hold, and it holds *because* π is transcendental rather than in spite of it. Suppose two addresses were equal:

```
2^a · 3^b · 5^c · π^d   =   2^a' · 3^b' · 5^c' · π^d'
```

Rearranging gives π^(d−d') equal to a ratio of integers — a rational number. But π is transcendental, so no non-zero integer power of it is rational. Therefore d = d'. With the π terms gone, the remaining equality is between two ordinary rational numbers with prime factorisations, and the fundamental theorem of arithmetic forces a = a', b = b', c = c'.

So every value has at most one address, and two different addresses are always two different numbers. The structure is not a lattice in the order-theoretic sense and the framework's use of the word is loose; what it is, precisely, is a free abelian group of rank four under multiplication, with the four generators multiplicatively independent. That is a stronger and cleaner object than the loose usage suggests, and the transcendence of π is what guarantees it.

16.5 · "The observer's mass makes the account unfalsifiable"

If the gear depends on who is looking, then any disagreement can be attributed to the observer and no measurement can ever contradict the formula.

This objection is partly conceded.

It is true that section 7.3 makes the observed period relational, and true that this is a place where an unscrupulous account could hide. Two things limit it, and neither is a complete answer.

The limit that is real: **the observer's contribution is a single fixed quantity, not a per-world adjustment.** The Earth's mass enters every gear identically. It cannot be tuned for Jupiter and then re-tuned for Saturn, because it is the same number in both, and moving it moves all eight together and breaks seven of them.

The limit that is weaker: the framework predicts that the same rotation observed from a different world carries a different gear, which is in principle a test. In practice no such observation is available, and the paper does not pretend that an untestable prediction is a strong one.

What would settle it is a second observer. Until there is one, this remains a place where the account has more freedom than it should, and a reader is right to hold that against it.

16.6 · "Six figures of agreement is what you get when you round"

The recorded rotation periods are not known to twenty figures. Printing twenty and calling the agreement exact is theatre.

The recorded values are not known to twenty figures and the paper does not claim they are. **The twenty figures are the framework's own values, not measurements**, and they are printed at that length for a specific reason: so that a reader can recompute them and get the same digits, and so that a later revision cannot quietly move a number and call it the same.

The comparison against observation is a separate matter and is stated at the precision the observations support. Where a recorded value is known to five or six figures, five or six figures is what the agreement can be — and that is why section 10.9's bracket, which is a prediction about where a *future* measurement must fall, matters more to the account than any present agreement does.

17 · What is not settled

Stated as a list, because a reader is entitled to know the size of the hole as well as the shape of the building.

The carrier is assigned, not derived. Section 16.3. Until a rule fixes the carrier in advance, this account is a **resolution** and not a **derivation**, and the paper uses the weaker word deliberately throughout.

The inverse is worked for two worlds, not eight. Section 9 gives Venus and Mercury in full. The remaining six are not worked as inverses here, and until they are, P-TEQ-ROT-1i is supported by two cases rather than eight.

The orbital periods carry no independent lattice identity. Section 12, and it is settled as a negative rather than open.

The true time equalization equation is applied to two worlds, not eight. Section 8.3 works the Earth and Mercury, the two worlds whose rotation and orbit are both fixed on the lattice. The other six wait on lattice values for their orbits, which section 12 does not supply. For Venus the equation takes the sum, 1 ÷ D = 1 ÷ P_rotation + 1 ÷ P_orbit, because Venus turns backwards.

Venus's retrograde sense is not accounted for. The magnitude $3^{5}\cdot(1+\delta_G)$ says nothing about which way the planet turns, and no part of this framework currently does.

Venus's de-projection lands on $27\cdot(1+\delta_G)$, not on 27. Section 9.2. The working notes of 17 July record the bare integer; the step is real and is carried here. The landing is still a lattice object.

Chapter 40 of the main work carries an arithmetic fault in Jupiter's form, corrected in section 10.5. Chapters 48 and 49 are right. The pure monomial $3^{13}/(5^8 \cdot \pi^2)$ supersedes both.

A rotation-gear reading has been withdrawn. Section 11 records it: the reading of Mercury's rotation gear as the Earth's mass times ten depended on an erroneous figure for the Earth's day and does not survive its correction.

Whether the frequency constant is derivable rather than defined. T_τ follows from the cancellation, but the paper does not derive its magnitude from anything more primitive than the cancellation itself.

Jupiter's exponents are larger than the rest. $3^{13}/5^8$ sits outside the bound within which section 16.2's counting is most favourable, and a reader who discounts Jupiter accordingly is being reasonable.

APPENDICES

Appendix A · Reproducing every number in this paper

Nothing in this paper needs to be taken on trust. The script below regenerates every value in it from the routes alone, in exact rational arithmetic with π carried symbolically, and prints them to twenty-five significant figures. It runs in a few seconds in any Python installation with SymPy.

```
import sympy as sp
pi = sp.pi

#  the two movers ------------------------------------------------
dG = 5**10/(2**4*3**9*pi**3) - 1          # the register step
r  = sp.Rational(5**6, 2**6*3**5)         # the helical turn

#  the two steps, and the identity between them -------------------
s703 = 800/(81*pi**2)
s612 = 2**9*3**5*pi/5**8
assert sp.simplify(s703/s612 - (1+dG)) == 0

#  the eight rotations, in days ----------------------------------
Y       = 15*pi**4/4                      # the Earth's sidereal year
mercury = 5**6/(3**3*pi**2)
venus   = 3**5*(1+dG)
earth   = Y/(Y+1)
mars    = 3**4/(2**3*pi**2)
jupiter = 3**13/(5**8*pi**2)
saturn  = 2**5*3**3/(5**4*pi)
uranus  = 2**2*5**3*pi/3**7
neptune = 2**2*3**4/(5*pi**4)

#  the second faces ----------------------------------------------
saturn_turned = saturn * r
uranus_turned = uranus * (1+dG)

#  the internal identities, all of which reduce to zero ----------
assert sp.simplify(mercury*sp.Rational(3,2) - 5**6/(2*3**2*pi**2)) == 0
assert sp.simplify(mercury*3/(2*pi) - 5**6/(2*3**2*pi**3)) == 0
assert sp.simplify(mars*24 - 3**5/pi**2) == 0
assert sp.simplify(jupiter*24 - 2**3*3**14/(5**8*pi**2)) == 0
assert sp.simplify(neptune*Y - 243) == 0
assert sp.simplify(mars/mercury - sp.Rational(3**7, 2**3*5**6)) == 0

#  print ---------------------------------------------------------
for name, v in [('Mercury',mercury), ('Venus',venus), ('Earth',earth),
                ('Mars',mars), ('Jupiter',jupiter), ('Saturn',saturn),
                ('Uranus',uranus), ('Neptune',neptune),
                ('Saturn turned',saturn_turned),
                ('Uranus turned',uranus_turned),
                ('the year',Y), ('delta_G',dG), ('r',r)]:
    print('%-14s %s' % (name, sp.N(v, 25)))
```

Every `assert` in that listing is one of the paper's claims, and each reduces to symbolic zero rather than to a small decimal. In order they are: the 703-over-612 identity of section 3.6; Mercury's 3:2 lock; Mercury's landing on

the silicon rung; Mars's hour form; Jupiter's hour form; the Neptune–Earth closure on 3^5; and the pure-rational ratio between the two stone worlds. If any one of them fails, the paper is wrong at that point and the reader will know it in the same second the script does.

The density counting of section 16.2 is a separate few lines: enumerate the addresses within an exponent bound, keep those whose logarithm falls in the working range, sort them, and for each of four thousand random targets take the distance to the nearest. No part of it depends on the framework being right.

Appendix B · Symbols and terms

T	the single substance; the field of which everything physical is a configuration
T⊙	the Sun's total T output
T_τ	the frequency constant — one rotation, one turn, 2π of angle, 86,400 native ticks; identical for every body
G	the register gear — a pure {2,3,5,π} object built from unit relabels, the target node's smooth number, the observing node's mass, and c = 3
F_B	the de-projection factor for body B, built from {2,3,5,π} and fixed in advance of the arithmetic
δ_G	the register step, $5^{10}/(2^4\cdot3^9\cdot\pi^3) - 1$ = 0.000090150603356200676413682 8
r	the helical turn, $5^6/(2^6\cdot3^5)$ = 1.00469393004115226337449
Y	the Earth's sidereal year, $15\pi^4/4$
Ξ_n	a node's own T-sphere radius at register n
c	the dimensional spin-orbit factor, = 3; NOT the metric speed of light
G_1	the first shell unit, $3^8/5$ = 1312.2 kJ/mol
H	hydrogen's ionisation unit, $2^8\cdot3^{12}\times10^{-7}$ = 13.6048896 eV
the lattice	the set of values 2^a·3^b·5^c·π^d with a,b,c,d whole; closed under multiplication and division, not under addition; every value has at most one address
an address	a particular (a,b,c,d)
a register	a level of the structure; the same T-value appears at every register wearing different units
a carrier	the physical identity that a world's clock is kept on — what the world is made of, or what reaches it
a face	a clean lattice value a world's clock may sit on; two worlds keep two faces, one fixed step apart
a route	a derivation in which the exponents were fixed before the arithmetic
a fit	a derivation in which the target was known first; admissible as description, worthless as evidence

Appendix C · The table of values, at full precision

Every value in the paper, in one place, at twenty-five significant figures. Days unless marked.

```
THE MOVERS

δ_G                   0.000090150603356200676413 6828
r                     1.004693930041152263374486
the 703 step          1.000703048319385396976587
the 612 step          1.000612842467910951824815

THE EIGHT ROTATIONS, IN DAYS

Mercury              58.63494423746398810409691
Venus               243.02190659661555676436 85
Earth                 0.99726987869923797958059 38
Mars                  1.02587698437866993586928 0
Jupiter               0.41353905527859937992120 38
Saturn                0.44003158666047222433380 98
Uranus                0.71824249053264591642950 24
Neptune               0.66523565010354492025710 04

THE SAME, IN HOURS

Mercury            1407.238661699135714498
Venus              5832.525758318773362345
Earth                23.93447708878171150993
Mars                 24.62104762508807846086
Jupiter               9.924937326686385118109
Saturn               10.560758079851333384 01
Uranus               17.237819772783501994 31
Neptune              15.965655602485078086 17

THE SECOND FACES

Saturn turned         0.44209706414415371046912 16
Uranus turned         0.71830724052652349471101 08

RELATED VALUES

the Earth's year    365.2840913775091396366512
Mercury's orbit      87.952416356195982156145 37
the silicon rung     27.996123639930112139255 25
1/α                 137.077838904018869706034 6
THE GAP               1.000228623685413808870599
G₁ shell unit      1312.2000000000000000000     kJ/mol
H                    13.604889600000000000000    eV

THE EARTH'S DAY, READ OUT

23 h 56 m 04.117519614 s
```

References

The values, forms and results in this paper are derived on the page. The related papers of the Universal Force of Time, each published at universalforceoftime.org, are:

1. S. Daubney, *The Days of the Worlds — Every Planet's Spin as a Single {2,3,5,π} Number*, Rev 3 (The Daubney Foundation, 2026).
2. S. Daubney, *The Rotation Law — the Earth's spin, the speed of light, and every planet's day*, Rev 3 (The Daubney Foundation, 2026).
3. S. Daubney, *The Time Equalization Law and the Double-Strand Synchronisation Principle*, Rev 9 (The Daubney Foundation, 2026).
4. S. Daubney, *Mercury's Perihelion Precession — One Number, Sixteen Roads*, Rev 15 (The Daubney Foundation, 2026).
5. S. Daubney, *One Spectrum, Five Registers — The Hydrogen Lines as Faces of the Tau-Lattice*, Rev 1 (The Daubney Foundation, 2026).
6. S. Daubney, *The Medium Is the Clock*, Rev 3 (The Daubney Foundation, 2026).

Conventional planetary data are referred to only where a measurement is being *tested against*, never as an input to a derivation.

A Note on the Numbers

Every value in this paper is given at full precision, because the precision is the evidence. A quantity truly on the {2,3,5,π} lattice does not approximate a lattice form; it *is* one. Where a value has not been read onto the lattice the paper says so, rather than rounding until it appears to fit. And a number in this framework is not a measurement of one thing: it is one address that may surface as a period, a frequency, a radius, an energy or a proportion, depending only on the register in which it is read. That is why the paper leads with the number and puts its lattice address behind it: the number is what is checked; the address is why it lands.

Attribution and contact

The Universal Force of Time is an original theoretical framework by **Stephen Daubney**, The Daubney Foundation.

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Every value in this paper was recomputed from its lattice form in exact rational arithmetic before printing. Plates built from the framework's own values; no measured figure is used in any derivation.

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