

Beyond Energy

The Known and Unknown Possibilities of the Net

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Summary

The Vacuum.Net theory describes the vacuum as a net of one strand under tension. Matter is where the strand winds around itself. What persists is what closes.

Most questions put to such a theory are old questions. How much energy does it give? Can it drive a vehicle? These questions come from the age of fire. They find only the part of the net that fits concepts we already have.

This essay maps the net from its own quantities. Ten quantities and five operations give fifty cells. Each cell is a possibility. Many have no name, so this essay gives them one. For each cell it states what it is, how it could be used, its status, and what would decide it.

The map is not drawn from the desk alone. The register of the net was run. Seven results came out. Two of them are new and proved here by algebra. Three steps at one depth are exactly one step at the next depth. And two rings lock into one identical state if, and only if, their length is a power of three.

The essay ends with the combinations of cells, the uses by domain, the boundaries the net sets, and a status ledger.

Part I — Ground

1. Why the list has no end

Every age names what it can build. The steam age gave us energy, work, efficiency and fuel. The electrical age added current, voltage and power. These words carry a picture: something is converted along a chain, and some of it is lost as heat.

A question asked in those words gets an answer in those words. “How much energy does the net deliver?” can only find taps. It cannot find a possibility that is not a quantity of energy.

The net has its own quantities: closure, address, phase, depth, rest and memory. Most of them have no counterpart in the vocabulary of the fire age. What they allow cannot be listed from today’s words. It must be found by running the net and seeing what closes.

There is a second reason. Science is bound to its time, its place and its language. Mathematics is a language too, and it changes. A map drawn today is a map in today’s terms.

There is a third reason. The net does not list its possibilities. It filters them. Only what closes remains. Each configuration that closes opens configurations that could not be named before it existed. The map grows as it is walked.

So this essay claims no final completeness. It claims something narrower. Every quantity of the net is paired with every operation, and every pair is described.

Where a word is missing, a word is given. Names introduced here are marked (*named here*).

2. The net in brief

Picture a fishnet stretched in water. Its strands run everywhere: through air, water, stone and body. They are always under tension. Where strands wind around one another, knots appear. That is matter. Between the strands lie meshes: openings with a shape and a size.

Five axioms carry the theory.

- **N1 (Strand).** There is one strand. Its only local act is self-crossing. A crossing has three states: over (+1), under (−1), none (0).
- **N2 (Closure).** Only what returns in phase onto itself persists. There is no external selector.
- **N3 (Memory).** A closed configuration constrains the next rewrite. The net carries its history as its shape.
- **N4 (Context).** What physics calls constants are state functions of the local tension χ .
- **N5 (Scale).** The same winding repeats at every depth. One step deeper multiplies the states by three.

Two units fix the scale. The unit of length is $S_0 = 45.6$ nm. The unit of time is $T_0 = 1.52 \times 10^{-16}$ s. Both follow from hydrogen: $S_0 = 1/(2R_H)$, with $R_H = 10,967,758$ m^{−1}, and $T_0 = S_0/c$. The layer at depth n has length $3^n \cdot S_0$ and time $3^n \cdot T_0$. One winding at depth 0 carries $E_0 = 4.357 \times 10^{-18}$ J.

The register is where the rules can be run. A window is three neighbouring crossings with trits (x, y, z). It closes when $x + y + z \equiv 0 \pmod{3}$. Of the 27 possible windows, 9 close. The basic rewrite of a ring of trits is

$$R(t)_i = -(t_{i-1} + t_{i+1}) \pmod{3}.$$

A ring is a fixed point of R exactly when every window closes (theorem T14).

3. Ten quantities, five operations

The net has ten quantities that can be acted on.

#	Quantity	What it is
Q1	Tension χ	the local state of the net
Q2	Density deviation δ	departure from a reference; the soft dial
Q3	Phase θ	where a winding stands in its turn
Q4	Coupling K	how strongly windings pull each other into step
Q5	Address	the trit string of a closed winding; its charge Q
Q6	Depth n	the rung on the ladder 3^n
Q7	Rest	what never closes
Q8	Memory	the orientation laid down first
Q9	Handedness	the sense of a winding: left or right
Q10	Trit law	the shares of +1, 0 and −1 in a medium

Each can be met by five operations.

1. **Read:** take its value without changing it.
2. **Set:** move it to a chosen value.
3. **Select:** let it decide what remains.

4. **Couple:** join it to the same quantity elsewhere: another mesh, another depth.
5. **Leave open:** build a configuration in which it never settles.

Ten times five gives fifty cells. Fire-age technology fills perhaps four of them. It reads and sets current. It reads and sets heat. The other cells are not empty because they are impossible. They are empty because they have no name.

Part II — What the register already shows

The register was run in three rounds. Each prediction was written down before the run. All results are reproducible from short scripts. Exhaustive counts cover every ring up to length 10. Samples cover longer rings.

R1. Charge is kept, modulo three

Under R, the total charge $\sum t \bmod 3$ never changes. The algebra is short: $\sum R(t) = -2 \sum t \equiv \sum t \pmod{3}$. Tested on rings of length 3 to 13, twenty steps each. No exception.

Meaning. The net keeps a count of windings. It does not keep their direction.

R2. A bias fades by the third power per depth

Pass a trit law one depth up, with the parent trit equal to the sum of a window. The bias amplitude $a = |p_0 + p_{+\omega} + p_{-\omega^2}|$, with $\omega = e^{(2\pi i/3)}$, becomes a^3 .

Law (0 / + / -)	depth 0	1	2	3
0.33 / 0.40 / 0.27	0.113	0.0014	3×10^{-9}	0
0.20 / 0.50 / 0.30	0.265	0.019	6×10^{-6}	0
0.05 / 0.90 / 0.05	0.85	0.61	0.23	0.012
0.00 / 0.99 / 0.01	0.985	0.96	0.87	0.67

Meaning. A weak order is local. Only a nearly pure order reaches across depths.

R3. A direction lasts only where it is held

Under free rewriting, a direction vanishes. With law 0.33 / 0.40 / 0.27 the signed share $D = (\#(+1) - \#(-1))/n$ drops from +0.13 to +0.003 in one step. The prediction that it would flip sign was wrong. It does not flip. It disappears.

Pin a fraction h of the sites to +1 at every step. Then a steady direction remains.

h	0	0.05	0.10	0.20	0.33	0.50
D (ring of 81)	0.008	0.060	0.117	0.243	0.427	0.628

D is about 1.25 to 1.3 times h . The held sites order their neighbours too.

Meaning. Every tap needs a hold that acts in every layer time. At depth 0 that is every 1.5×10^{-16} s. A fixed wall does this. A loose bias does not.

R4. Memory raises closure

Apply N3 literally: sites inside a closed window are frozen, and only the rest is rewritten. The share of closed windows rises from 1/3 to a plateau.

After step	1	2	3	6	11	40
Closed share (ring of 243)	0.53	0.60	0.62	0.62	0.62	0.62

The prediction was a rise toward 1. That was wrong. The plateau lies near 0.62.

Meaning. Memory almost doubles closure, but leaves a large part open. A net with memory is ordered, but not frozen.

R5. Three steps below are one step above

This is the first of two results proved here.

Write a ring of trits as a polynomial over the field of three elements. Shifting by one place is multiplication by x . Then R is multiplication by $-(x + x^{-1})$.

In a field of characteristic three, $(a + b)^3 = a^3 + b^3$. Therefore

$$R^3 = -(x + x^{-1})^3 = -(x^3 + x^{-3}).$$

So three steps of R are one step of the same rule, with neighbours three places apart. Now group the ring into blocks of three and take each block sum as the parent trit. The block sums of $R^3(t)$ are exactly R applied to the parent ring:

$$\text{coarse}(R^3(t)) = R(\text{coarse}(t)).$$

Checked on every ring of length 9 and on 2,000 random rings each of length 12, 27, 30, 81 and 243. No exception. Among the powers 1 to 9, only 3, 6 and 9 have this property.

Meaning. This is N5 written as algebra. The same rule runs at every depth. One step at depth $n + 1$ takes three steps at depth n . That is exactly the layer time $3^n \cdot T_0$ of the units. The axiom of scale and the unit of time agree, from two separate directions.

Status. Proved here, under the definitions above. Computed.

R6. Two rings lock only at lengths 3^k

This is the second result proved here.

Couple two rings a and b . Each reads its own neighbours and the other ring at the same site:

$$a' = -(a_{i-1} + a_{i+1}) - k \cdot b_i, \text{ and } b' \text{ the same with } a \text{ and } b \text{ exchanged.}$$

With $k = 0$ or $k = 1$, the rings agree at the chance level of about $1/3$. With $k = 2$, which is $-1 \bmod 3$, they become identical. But only on some lengths.

Ring length	9	27	81	243	10	18	28	30	54
Locked runs (of 200)	200	200	200	200	0	0	0	0	0
Most steps to lock	5	14	41	122	—	—	—	—	—

The proof is short. Let $d = a - b$. With $k = 2$, $d' = -(x^{-1} + 1 + x) \cdot d$. Over three elements, $1 + x + x^2 = (x - 1)^2$. So $d' = -x^{-1}(x - 1)^2 \cdot d$. On a ring of length 3^k , $(x - 1)^{3^k} = x^{3^k} - 1 = 0$. The operator is nilpotent. The difference reaches zero in at most $\lceil 3^k/2 \rceil$ steps: 5, 14, 41, 122. On any other length, $x^n - 1$ has factors other than $x - 1$. Then part of the difference never vanishes.

Meaning. Lock is nilpotence. Nilpotence is closure: the foundational paper identifies Rowlands' condition $Q^2 = 0$ with closure (C3). Here the same identity appears as a working rule. Two meshes become one state when they are joined in counter-winding and their size sits on the ladder of three. Off the ladder, they stay two.

Status. Proved here, under the definitions above. Computed.

R7. What does not rest keeps circulating

Run every ring of length n under R and record where it ends. Almost none come to rest.

n	Rings at rest	Cycle lengths
5	3 of 243	$8 = 3^2 - 1$
7	3 of 2,187	$26 = 3^3 - 1$
11	—	$121 = (3^5 - 1)/2$
19	—	$9,841 = (3^9 - 1)/2$
23	—	$177,146 = 3^{11} - 1$
9	9 of 19,683	3, 9
27	—	27

On lengths not divisible by 3, every cycle length found divides $3^j - 1$ for some j . On lengths divisible by 3, cycles are short. At length 7, 99.86 % of all rings never rest.

Meaning. On the register, endless circulation is the normal state. Rest is the exception. The ring length chooses the period: 27 steps or 177,146 steps.

Prediction record

Prediction	Outcome
Charge mod 3 kept under R	Confirmed
Bias amplitude $a \rightarrow a^3$ per depth	Confirmed
Closed share stays near $1/3$ under R	Confirmed
Direction flips sign under R	Refuted: it vanishes
Hold keeps a direction that grows with h	Confirmed
Memory raises closure toward 1	Refuted: plateau at 0.62
Coupling $k = 1$ raises agreement	Refuted: chance level
Some power of R commutes with coarse-graining	Confirmed: R^3 , proved
Cycle lengths on n coprime to 3 divide $3^j - 1$	Confirmed

Three of nine predictions failed. Each failure narrowed the map.

Part III — The fifty cells

Each cell gives the possibility, a name where none exists, its use, its status, and what decides it. Status words follow the ledger at the end.

Q1 — Tension χ

Read: the tension map (*named here*). χ is the local state of the net. Constants are functions of it. Reading χ means reading a local constant against a reference. Two clocks at different heights do this already. A pre-registered map of χ along a line of sight turns astronomy into a reading of the net: the theory predicts $\Delta\alpha/\alpha \approx 3 \times 10^{-8}$ at the white dwarf G191-B2B. *Use:* finding where a mesh fits; why a builder’s apparatus worked at one place and not at another. *Status:* predicted. *Decides:* the white-dwarf benchmark with its map fixed first.

Set: tension setting. Changing χ itself is hard. The fine-structure constant follows $\Delta\alpha/\alpha = \beta \cdot \Delta\chi$, with $\beta = \alpha/4\pi = 5.81 \times 10^{-4}$. A 1 % change needs $\Delta\chi = 17.2$. At the Earth’s surface χ is about 7×10^{-10} . This dial does not move by human means. *Use:* none in reach. *Status:* computed boundary. *Decides:* nothing needed; it is a limit worth knowing.

Select: place choice (*named here*). Large meshes fit large windings, and those differ by place. Choosing the place is choosing what fits. *Use*: siting of large meshes: water channels, towers, buildings. *Status*: corresponded. *Decides*: a χ map compared with where large meshes work.

Couple: the tension bridge (*named here*). A strand between two regions of different χ carries passage between them. Over height, the difference is small: $\Delta\chi = g \cdot h / c^2 = 9.81 \times 100 / 9 \times 10^{16} = 1.1 \times 10^{-14}$ per 100 m. Between ground and upper atmosphere, the difference is held by the planet itself. *Use*: a mast or a line between two held states. *Status*: open; the acceleration reading and the potential reading of χ are not yet one (O4). *Decides*: unifying the two readings.

Leave open: the held slope (*named here*). A gradient between two regions that never equalise, because each is held by something larger. Passage then never stops. *Use*: continuous flow without a store. *Status*: open. *Decides*: as for the bridge.

Q2 — Density deviation δ

Read: lever reading (*named here*). The coupling of a medium follows $g_{\text{eff}} = \bar{g}(1 + \gamma\delta)$. Its lever is $1/\varepsilon$, with ε the distance to the critical point. Reading the lever tells how close a medium sits to its tipping point. *Use*: finding media where small settings move a lot. *Status*: proved (T4). *Decides*: measured g_{eff} against δ in a near-critical medium.

Set: the soft dial. δ is continuous. It is the fine knob of every tap. Near a Feshbach resonance a coupling is already set at will: $a_s(B) = a_{bg}(1 - \Delta/(B - B_0))$. It can be made strong, weak, zero or negative. *Use*: stepless control of passage. *Status*: measured in ultracold gases. *Decides*: the same in a solid at room temperature.

Select: soften, write, harden. Move δ toward the critical point; impose the mesh; return δ . Only what closes in the mesh remains. *Use*: making a substance by setting the state in which it alone stays. *Status*: predicted. *Decides*: the rewrite rule O2.

Couple: the stiffness relay (*named here*). A softened mesh changes the stiffness its neighbours feel. Softening can spread through an array like a wave. *Use*: switching a whole surface by touching one point. *Status*: open. *Decides*: a lattice run with δ coupled between neighbours.

Leave open: poised matter (*named here*). A medium held at $\varepsilon \approx 0$, permanently at its tipping point. Its lever is maximal. It answers the smallest setting. *Use*: the most sensitive reader possible; a material that takes the form it is given. *Status*: open. *Decides*: holding a medium at criticality and measuring its lever over time.

Q3 — Phase θ

Read: the coherence reading. Give each winding an orientation as a unit quaternion D_i . Form $B = (1/k) \sum D_i D_i^T$. Its largest eigenvalue R_Q lies between $1/4$ and 1 . It reads whether an ensemble closes together. *Use*: diagnosing grids, groups, structures as coherence rather than load. *Status*: proved (T22). First measured value $R_Q \approx 0.70$. *Decides*: already in use.

Set: phase imprint. Writing the phase of windings so that the wanted ones arrive together. *Use*: the “write” step of every selection. *Status*: measured in ultracold gases as phase imprinting. *Decides*: the same in a solid mesh.

Select: phase gate (*named here*). Only windings that arrive in phase enter the mesh together. Phase selects as size selects. *Use*: passing one winding among many of the same size. *Status*: predicted. *Decides*: a mesh whose passage changes with imposed phase.

Couple: the counter-lock (*named here*). Result R6. Two rings of length 3^k joined

in counter-winding become one identical state in at most $\lceil 3^k/2 \rceil$ steps. On any other length they stay two. *Use*: two separated structures held in one identical state. Clocks that agree without a master clock. Equality tests that answer in a fixed number of steps. A measure of whether two systems share a size on the ladder. *Status*: proved here. *Decides*: a physical pair of meshes of 3^k cells with counter-coupling.

Leave open: free running (*named here*). Rings off the ladder never lock. Their difference persists. *Use*: keeping diversity where uniformity would be a loss: grids that must not all fail together, groups that must keep different views. *Status*: proved here, as the converse of R6. *Decides*: as above.

Q4 — Coupling K

Read: the closure trace (*named here*). K learns: $K \leftarrow K + \eta(s - K)$, with s the observed closure. Its value records the history of what closed together. *Use*: reading the past of a system from its present couplings. *Status*: defined in the applied theory. *Decides*: comparing learned K with known history.

Set: coupling knob. K is continuous. It sets how strongly windings pull each other into step. *Use*: tuning arrays from independent to collective. *Status*: defined. *Decides*: array passage measured against K.

Select: partner choice (*named here*). Couplings decide which windings close together. R6 shows the sharp form: $k = 2$ locks, $k = 1$ does not. *Use*: choosing which meshes act as one. *Status*: proved here for the register. *Decides*: a physical analogue of counter-coupling.

Couple: the depth gear (*named here*). Result R5. Three steps at one depth equal one step at the next. A coupling across depths must keep a 3 : 1 rhythm. Then the same rule runs on both. *Use*: passing order from a fine structure to a coarse one, or back, without loss of form. *Status*: proved here. *Decides*: a two-depth structure driven at 3 : 1 against one driven off ratio.

Leave open: open coupling (*named here*). Between closures K relaxes toward its base value. A system that keeps forgetting stays able to learn. *Use*: structures that adapt instead of setting hard. *Status*: defined. *Decides*: learning speed with and without relaxation.

Q5 — Address

Read: address reading (*named here*). Every closed winding has a unique trit string. Balanced ternary gives each integer one string, with no sign and no rounding rule. Reading the string identifies the winding. *Use*: identification of matter by its address rather than its stuff. *Status*: proved (T7). *Decides*: mapping known spectra onto addresses.

Set: no setting. An address cannot be shifted. The charge Q is conserved as long as the strand stays continuous (T3). *Use*: a boundary. No change of matter by pushing. *Status*: proved. *Decides*: nothing; it is a limit.

Select: matter by selection. The address already exists in the net. Soften-write-harden selects it. *Use*: substances without furnace or reactor. *Status*: predicted. *Decides*: O2.

Couple: mirror pairing (*named here*). The address of $-Q$ is the mirror of the address of Q: swap +1 and -1 (T7.1). A winding and its mirror together sum to rest. *Use*: holding a winding as a pair that sums to zero, and releasing it by separation. A store that shows nothing while full. *Status*: open. *Decides*: a lattice run of paired windings under R.

Leave open: the cut (*named here*). A new address needs a break in the strand.

That lies outside every soften-write-harden cycle. *Use*: the only route to what does not yet exist. *Status*: open. *Decides*: a rule for strand breaks; none exists yet.

Q6 — Depth n

Read: depth reading (*named here*). Every phenomenon has a length and a rhythm, and so a depth: $n = \log_3(L/S_0)$.

Depth	Length	Rhythm
−1	15.2 nm	2.0×10^{16} Hz
0	45.6 nm	6.6×10^{15} Hz
2	410 nm	7.3×10^{14} Hz
5	11.1 μ m	2.7×10^{13} Hz
8	0.30 mm	1.00 THz
14	0.22 m	1.37 GHz
31	28,160 km	10.65 Hz

Depth 2 is the violet line of hydrogen at 410 nm. Depth 5 lies at the band where a room at 20 °C radiates most (9.9 μ m). Depth 31 lies within 0.5 % of the ideal lowest mode of the cavity between Earth and ionosphere, $(c/2\pi a) \cdot \sqrt{2} = 10.59$ Hz. The chance of landing that close on a ladder of factor 3 is about 1 %. *Use*: knowing at which rung to build. *Status*: computed; the three matches are correspondences. *Decides*: further matches predicted before they are checked.

Set: depth by size. A mesh of width d passes windings up to 2d. Its size sets its depth. *Use*: building for one rung. *Status*: corresponded with the measured cavity. *Decides*: the thickness series against thresholds at 7.6, 22.8, 68.4, 205 and 615 nm.

Select: one-rung passage (*named here*). A thin mesh admits one depth only. A 33 nm cavity passes up to 66 nm: depth 0 alone. That gives the cleanest passage. Thicker cavities admit several depths and pass less. *Use*: the design rule for every deep tap. *Status*: corresponded with measurement. *Decides*: as above.

Couple: the depth gear. As in Q4. In addition, R2 sets its range: a law reaches across depths only when nearly pure. At 90 % order, three depths; at 99 %, six or more. *Use*: making a small structure act on a large one. *Status*: proved here (gear); computed (range). *Decides*: a pure-order layer coupled to a mesh three depths up.

Leave open: the between-rung mesh (*named here*). The ladders $\times 3$ and $\times 2$ never meet (T15). Between rungs nothing is stable. *Use*: see rest, below. *Status*: proved (T15–T17).

Q7 — Rest

Read: loss address. Every irreversible step happens at a mesh with an address. Entropy production there is $\sigma = \sum J \cdot X \geq 0$ (T6). *Use*: finding loss by place rather than by total. *Status*: proved. *Decides*: already usable.

Set: the comma choice (*named here*). A mesh pair built on both ladders never closes. Its rest per turn is chosen by the ratio.

Ratio	Rest per turn
9 : 8	12.5 %
243 : 256	5.1 %
$3^{12} : 2^{19}$	1.36 %
$3^{53} : 2^{84}$	0.21 %

Use: setting how much passes per turn by geometry alone. *Status:* computed.

Decides: a lattice run of comma pairs.

Select: period choice (*named here*). Result R7. The ring length selects how long a configuration circulates before it returns: 27 steps at length 27, 177,146 steps at length 23. *Use:* timekeepers of chosen period; keys whose return time is set by size. *Status:* computed. *Decides:* already shown on the register.

Couple: the rest catcher (*named here*). A neighbouring mesh receives what a non-closing mesh passes on. *Use:* passage that does not depend on a wall difference. *Status:* open. *Decides:* how much of the rest a neighbour can take.

Leave open: perpetual circulation (*named here*). At length 7, 99.86 % of rings never rest. Circulation is the normal state. *Use:* a carrier that never stops, with nothing made and nothing lost. It is not perpetual motion: nothing leaves the net and nothing enters it. *Status:* computed on the register. *Decides:* a physical ring of seven cells under a rewrite.

Q8 — Memory

Read: origin reading (*named here*). The net carries its history as its shape. The orientation laid down first can be read from the present form. *Use:* reading what a place, material or body started as. *Status:* open. *Decides:* a run in which the first orientation is recovered from later states.

Set: the imprint (*named here*). Result R4. Freezing what has closed raises closure from $1/3$ to 0.62. *Use:* materials and places that keep their form because it was laid down first. Repair by restoring the first orientation, not by replacing parts. *Status:* computed. *Decides:* a material with an imprinted first layer, tested for self-repair.

Select: path dependence. Memory decides the next rewrite. Two equal states with different histories go different ways. *Use:* designing sequences, not states. *Status:* assumed (N3). *Decides:* a run with equal states and different histories.

Couple: common origin (*named here*). Two structures laid down together carry the same first orientation. They stay matched. *Use:* parts that fit because they share a beginning. *Status:* open. *Decides:* a run of two imprinted rings after separation.

Leave open: forgetting (*named here*). Unfreezing releases memory. The plateau of 0.62 shows that memory never takes all. *Use:* reshaping what has set. *Status:* computed (plateau). *Decides:* closure share after release.

Q9 — Handedness

Read: hand reading (*named here*). The first knot, the trefoil, is chiral. Its Jones polynomial is $t + t^3 - t^4$; its mirror's is $t^{-1} + t^{-3} - t^{-4}$. Left and right are distinct. *Use:* identifying the sense of any winding. *Status:* proved (T8). *Decides:* already usable.

Set: helical sense. A helical mesh has one sense, chosen when it is built. *Use:* one-sense structures. *Status:* corresponded. *Decides:* building both senses and comparing.

Select: hand gate (*named here*). A helical mesh passes one sense of winding. That gives a one-way passage without two different materials. Life chose one hand for its molecules. That is selection by handedness at the scale of chemistry. *Use:* taps and filters from one material. *Status:* predicted. *Decides:* a left and a right helical cavity of the same size, compared.

Couple: chiral pair (*named here*). Left and right together sum to rest. *Use:* balanced structures that pass nothing until one side is removed. *Status:* open. *Decides:* a paired run.

Leave open: achiral balance. A mesh without a hand passes both senses equally. Net passage is zero. *Use:* the reference state for every test of handedness. *Status:* corresponded.

Q10 — Trit law

Read: law reading (*named here*). The shares of +1, 0 and −1 in a medium. Uniform shares close 1/3 of windows. *Use:* characterising a medium by its law. *Status:* proved (T12). *Decides:* already usable.

Set: the bias. A small bias is amplified to the third power in homogeneous closures: $(p+/p-)^3$. With 0.40 against 0.27 that is 3.25. *Use:* materials with a built-in preference. *Status:* proved. *Decides:* a biased medium in a mesh.

Select: held bias. Result R3. A bias without a hold is erased in one step. A held fraction h keeps a direction of about $1.3 \cdot h$. *Use:* the rule that every tap must hold its asymmetry in every layer time. *Status:* computed. *Decides:* the same with a physical wall.

Couple: depth fading (*named here*). Result R2. A law passed upward fades by the third power per depth. *Use:* knowing how far an order reaches. *Status:* computed. *Decides:* as above.

Leave open: the uniform rest. The uniform law is the resting state. Everything else is departure from it. *Use:* the baseline of all reading. *Status:* proved.

Part IV — Combinations

Single cells are building blocks. The larger possibilities lie in combinations. Seven stand out.

1. The held deep tap. One-rung passage (Q6) plus a held asymmetry (Q10, R3) plus a soft dial (Q2). This is the known tap, written in full. Its ceiling at depth 0 is 1.38×10^{13} W/m² per layer, from one closure per mesh per layer time: $E_0/T_0 = 0.0287$ W per mesh, and 4.81×10^{14} meshes per m². The measured cavity reaches $\eta = 5.1 \times 10^{-12}$ of that, or 70 W/m². Every other combination is a way to raise η .

2. The locked array (*named here*). Counter-lock (Q3, R6) on arrays of 3^k cells. All meshes in one identical state. If their closures add in phase, passage could grow faster than the count. *Status:* lock proved on the register; gain open.

3. The geared column (*named here*). Locked arrays stacked across depths, driven at 3 : 1 (R5). One rule from the finest layer to the coarsest. Order written at the bottom reads at the top. *Status:* gear proved; physical column open.

4. Poised memory (*named here*). Poised matter (Q2) with an imprint (Q8). A medium at its tipping point that remembers its first form. It takes any form it is given and returns to its first form when released. *Status:* open.

5. The circulating store (*named here*). A ring of chosen length (R7) with a rest catcher (Q7). Tension circulates with a fixed period. A neighbour takes a part each turn. *Status:* circulation computed; catching open.

6. The person in the mesh. A hold need not be a wall. R3 shows that whatever pins a share of sites sets the direction. A hand near a box, a body in a room, a group in step: each can be the hold of a large mesh. That is why large meshes worked for their builders and not for strangers. *Status:* corresponded with historical reports; open as technology.

7. Matter by address. Address reading (Q5), soften-write-harden (Q2), phase gate (Q3) and one-rung passage (Q6). The target address already exists. The combination makes it the only one that stays. *Status:* predicted; waits on O2.

Part V — Uses by domain

Light, warmth and cold. Taps at depth 2 meet light directly. Taps at depth 5 meet the warmth already in every room; its ceiling, $3,954 \text{ W/m}^2$, lies within a factor 9.5 of what a room radiates. Cold is the same passage in the other sense: warmth leaving matter through a mesh.

Current. The held deep tap. At the measured density, a household of 291 W needs 4.2 m^2 of active surface in one layer.

Motion. A one-way passage carries a push of P/c . At the ceiling of depth 0, that is $4.6 \times 10^4 \text{ N/m}^2$: 4,690 kg per square metre against gravity. A second route sets mass itself: $\Delta m/m = s_m \cdot \gamma k \cdot \Delta \chi$. The susceptibility s_m is open.

Materials. Matter by address. Poised memory. Imprinted repair. Substances made by setting the state in which they alone stay.

Synchrony. The counter-lock gives agreement without a master. Free running keeps difference where it is needed. Clocks, grids and groups can be held in step, or deliberately out of step.

Computation. The register is balanced ternary: no sign, no rounding rule. The counter-lock is an equality test that ends in a fixed number of steps. The depth gear is an exact coarse-graining. A computer built on the net counts in trits and compares by locking.

Timekeeping. Period choice gives rings that return after 27, 9,841 or 177,146 steps. Length alone sets the time.

Measurement. The tension map, the lever reading, the coherence reading, the hand reading. Each reads a quantity that fire-age instruments do not see.

Water and land. Large meshes in water hold their winding when cool and shaped. Channels that keep water turning carry it further with less. Place choice decides where they work.

Care of the body. A body is a knot structure. In the net, a disorder is a loop that does not close. Care then means setting the state so that the closed configuration is the one that stays. The coherence reading and origin reading are its instruments. *Status*: open; no clinical claim is made.

Navigation. Every place has a χ . A tension map is a map of where one is in the net, not only on the ground.

Part VI — Boundaries

The net also says what cannot be done. These limits are possibilities too: they spare effort.

- **Addresses cannot be pushed.** Q is conserved (T3). Matter is selected, not converted.
- **α does not move.** A 1 % change needs $\Delta \chi = 17.2$, ten orders beyond the Earth's state.
- **A loose bias is erased.** Without a hold, a direction vanishes in one step (R3).
- **Weak order stays local.** A law of 0.40 against 0.27 is gone two depths up (R2).
- **Ordinary coupling does not lock.** $k = 1$ leaves agreement at chance (R6).
- **Lock needs the ladder.** Off lengths 3^k , two rings stay two (R6).
- **Memory never takes all.** Closure under memory stops near 0.62 (R4).

Part VII — How to go on

The method that produced this map can continue it.

1. **Enumerate.** Combine the ten quantities on the register.
2. **Predict first.** Write down the expected outcome before each run.
3. **Filter.** Keep what closes. Keep the failures as boundaries.
4. **Name afterwards.** Give a configuration a name only once it has been seen.
5. **Then ask what it means for people.**

The next runs are clear:

- the stiffness relay and poised matter: δ coupled between neighbours;
- the rest catcher: how much of a comma rest a neighbour takes;
- mirror pairing and chiral pairs under R;
- origin reading: recovering a first orientation from later states;
- the gain of a locked array: does passage grow faster than N ?
- the thickness series of the measured cavity, against 7.6, 22.8, 68.4, 205 and 615 nm.

Each is short to run. Each will open cells that cannot be named today.

Part VIII — What it means for people

A world that works with the net needs no long chain. Fuel imports, pipelines, central plants and the conflicts around them lose their reason. That is a loss for the many people whose working lives depend on them. Their knowledge stays useful. Whoever understands flow, pressure and failure understands what a mesh needs. That work moves from the harbour and the plant to the street and the house.

The deeper change is in what counts as a resource. In the fire age, a resource is a stock: a seam, a field, a reserve. In the net, the resource is a fit. It is everywhere. It is reached by shape, phase and depth. Access no longer depends on owning the land above a deposit. It depends on knowing how to make a mesh that closes.

That shifts weight from those who hold stocks to those who understand fits. Whether that understanding is shared or held is a choice people make. The net does not make it for them.

The person also returns to the work. Large meshes include whoever stands in them. A light that closes where someone walks. A room that is warm where someone sits. Tools that work for their user because the user completes them. The fire age removed the person from the apparatus. The net puts the person back.

Status ledger

Claim	Status
N1-N5	Assumed
Window closure, rewrite fixed points, closure probability (T9-T14)	Conditionally proved
Charge conserved (T3); unique address (T7); trefoil chiral (T8)	Conditionally proved
$g_{\text{eff}} = \bar{g}(1 + \gamma\delta)$; lever $1/\varepsilon$ (T4)	Conditionally proved
Loss has an address (T6); R_Q bounds (T22)	Conditionally proved
Two ladders never meet; comma (T15-T17)	Conditionally proved
Units S_0 , T_0 , E_0 and layer at depth n	Conditionally proved
R1 charge mod 3 kept under R	Proved here (algebra); computed
R2 bias amplitude $a \rightarrow a^3$ per depth	Proved here (algebra); computed
R3 held fraction h keeps direction $\approx 1.3 \cdot h$	Computed
R4 memory raises closure to 0.62	Computed
R5 coarse(R^3) = R(coarse)	Proved here (algebra); computed

R6 counter-lock iff length 3^k , within $[3^k/2]$ steps	Proved here (algebra); computed
R7 cycle lengths divide $3^j - 1$ on n coprime to 3 (all lengths run, 4-32)	Computed
One closure per mesh per layer time; ceiling $1.38 \times 10^{13} \text{ W/m}^2$	Assumed (this essay) and derived
1.4 pW from $0.02 \mu\text{m}^2$; $\eta = 5.1 \times 10^{-12}$	Measured (external); derived
Coupling set at will near a Feshbach resonance	Measured (external)
Depth 2 = 410 nm line; depth 5 near room radiation; depth 31 near Earth cavity mode	Corresponded
Matter by address; held deep tap at higher η ; hand gate	Predicted
Mirror pairing, rest catcher, poised matter, origin reading, locked-array gain, person in the mesh, care of the body	Open
Rewrite rule O2; γ at the working point O1; one χ O4; s_m	Open

The statuses are those of the foundational paper — assumed, conditionally proved, corresponded, predicted, open — with three added here: proved here, computed, and measured (external).

Annotated references

The net

Konstapel, J. (2026). *The Vacuum.Net Theory: Foundational Paper, Eighth Edition, Version 8.1*. Constable Research, Leiden. *Why read?* The axioms, theorems T1-T23, units, ladders and statuses. Every “conditionally proved” claim here is proved there. *Reading advice:* Part 0 first; then Part III.4-III.5 for the register and ladders; Part VII for units.

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Distinction, closure and number

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