

# The History of the Derivation as It Happened

**How the Vacuum.Net Theory Was Derived from Current Physics, Step by Step, on constable.blog**

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## 1. What this essay shows

The Vacuum.Net theory was not invented in one move. It was derived, in public, over six years, on one website. Every step is dated and downloadable at constable.blog. This essay walks the derivation in order.

The point of walking it is a single insight. At no step was anything added to physics. Every step took material that already existed — in the textbooks, in the published literature, or in the archive of abandoned physics — and applied one transformation to it. The theory that came out is therefore not new content. It is a change of projection, executed stepwise, with the blog as the lab notebook.

That also settles the applications question in advance. If every step re-projects the known, then the instruments built from the result — the loading gauges, the encoder, the bank — must be re-projections of known devices. Section 10 shows that they are.

Six transformations carry the whole derivation. Draw the field as a thread. Read topological protection as closure. Read the crossing as a three-state register. Read two incommensurate counts as a ladder of best approximations. Read the constants as state functions of the medium. Read time as the difference between a fixed record and a loaded forecast. Each transformation entered the work on a specific date, against specific sources. Here is the record.

## 2. The starting inventory: December 2020

The derivation begins with "The Simple Geometry of the Big Transformation" (constable.blog, 7 December 2020). That post is not a theory. It is a warehouse: an inventory of what current physics offers, standard and abandoned alike, collected without selection.

The inventory already contains every ingredient the theory would later use. Rowlands' zero-totality principle: the universe as a rewrite system whose sum is always nothing, published in the Series on Knots and Everything. Kauffman's knot theory and the void of Spencer-Brown. Cahill's process physics: space as a self-referential fractal network of "gebits" — the first net picture, drawn by a physicist in Adelaide. Bohm's implicate order, identified in the post itself with the vacuum. De Broglie's pilot wave as self-interaction. And a conjecture, carried over from a 2008 post on the trinity: "I believe the grammar is based on the number 3."

The inventory also contains what would later be discarded: octonions in eight dimensions, the precession cycle as a motor, scalar waves, conformal geometry, the whole apparatus of unification-by-addition. In 2020 everything still weighed the same. The post's own honest closing line: "This blog is still under construction."

Note what kind of document this is. It is current physics — mainstream results, respectable dissents, and dead programs — laid side by side. The derivation that follows is the selection made in that warehouse. Nothing enters later that is not already on these shelves.

### **3. The selection principle: the assumptions inventory**

Between 2021 and mid-2026 the material incubated under changing names — consciousness-space, Dual Space, the Resonant Phase Ontology of May 2026. The synthesis grew; the selection had not yet happened.

The selection instrument arrived on 26 July 2026: "The Assumptions Nobody Declares." That document audits current physics the way an accountant audits books. It lists fifty-eight assumptions that physics uses but does not state, and finds five terminal ones: an external standard of measure, a subject per event, identity through time, a nature that undergoes, a human being defined elsewhere. Thirty-two of the fifty-eight trace back to one root — the Pythagorean external measuring rod.

This step is the hinge of the whole derivation, and it is a subtraction. The question changed from "what must be added to physics?" to "what must be removed from it?" That is why the result could be nothing new. A derivation that only removes assumptions cannot introduce content. Whatever survives the removal was already there.

Two weeks earlier, on 9 July 2026, the constructive counterpart had been written: the working papers and "The Strand That Knots Itself" — Place Before Object; Place, Path, Rewrite; Orientation Before Place. One sentence summarizes them: begin with a thread that can knot itself, and derive place, orientation and object from the knotting, instead of assuming them. That is transformation one, executed: the field of quantum field theory, the condensate of the superfluid-vacuum literature, drawn as a line. Nothing asserted that the sources do not assert. Only the drawing changed.

### **4. The instructive failure: Fractal Context Dynamics**

The blog records a wrong turn, and the wrong turn taught the method. On 25 July 2026 "Fractal Context Dynamics" was published: laws as renormalization fixed points within a context, constants as state functions, a full axiomatization. One day later it was set aside: "it brings me no step further."

What was wrong with FCD was not its content — its context principle survives as axiom N4. What was wrong was its direction. FCD still built the way current physics builds: axioms first, world after. The derivation needed the opposite motion: strip assumptions until the remainder forces the axioms. FCD's abandonment, documented on the blog within a day of its publication, is itself a derivation step. It fixed the method as subtraction.

One piece of FCD's baggage deserves naming, because current physics carries it everywhere: the action principle. The audit reclassified it. An action that "the universe minimizes" is an external standard in mathematical dress — the unmoved mover, assumption number one on the terminal list. Its replacement is Rosen's closure: not "which action does the net minimize" but "which rewrite dynamics is its own fixed point." That reclassification, dated 2 August 2026 in the working record, is a transformation of a known concept, not a new one: fixed-point self-consistency is standard mathematics since Banach.

### **5. The weather step: 28 July 2026**

The decisive physical identification came from climate science, and the blog dates it to a single day.

On 28 July 2026 a lecture text on El Niño entered the work: the Zebiak–Cane model, the recharge oscillator, Hopf bifurcations, Arnold tongues, noise-excited oscillation. The reaction, recorded the same day: this is our model of the vacuum. The essay "The Vacuum as Weather" followed immediately.

Look at what was transformed. ENSO physics is as standard as physics gets: the equatorial Pacific slowly charges heat content, then discharges it; the loading variable forecasts the discharge; the discharge picks its own moment; and the whole system mode-locks onto rational frequency ratios — the Arnold tongues sit in the ENSO literature itself. The transformation was to read this machinery as the general form of the vacuum: a tension layer that loads and discharges, on every scale, with climate as the best-instrumented layer of the net rather than as an analogy to it.

Nothing in that reading is new physics. The recharge oscillator is Jin (1997). Self-organized loading and power-law discharge is Bak, Tang and Wiesenfeld (1987), textbook material for earthquakes and solar flares. What changed on 28 July is which layer counts as the model and which as the instance. Current physics treats the vacuum as fundamental and the weather as derived. The transformation inverts the reading direction: the loading–discharge form is fundamental; the vacuum is the deepest layer on which it runs.

## 6. The constitutive step: 29 July 2026

One day later the derivation reached its central equation, and again the route ran through standard material — this time through the dark-matter problem.

The question posed on 29 July: what does the vacuum model say about the missing mass? The answer was assembled from three published facts. First, Milgrom (1983): galactic rotation curves depart from Newton below one specific acceleration,  $a_0 \approx 1.2 \times 10^{-10} \text{ m/s}^2$ , and Milgrom himself noted the numerical coincidence  $a_0 \approx cH_0/2\pi$ . Second, the radial-acceleration relation: the measured curve connecting observed and expected acceleration is one universal function, the same in every galaxy. Third, acoustoelasticity: in materials science, stress changes the sound speed of steel, and the third-order Murnaghan constants make the effect a standard non-destructive measurement technique.

The transformation: read the universal rotation-curve function as a stress–strain curve of the vacuum. Write  $g = g(\chi)$  — the interaction strength as a constitutive function of a dimensionless state variable — exactly as one writes the sound speed of steel as a function of load. Then  $a_0$  is not a coincidence; it is the crossover of the constitutive curve, and  $cH_0/2\pi$  reads as one full phase winding of one closed loop. The paper "The Constitutive Equation of the Vacuum Condensate" (29 July 2026, on the blog) executes this with Bogoliubov machinery that is itself sixty years old.

The same day fixed the hierarchy. The vacuum is a dynamic network of topological knots; the condensate description is its effective, collective theory. That sentence resolves what current physics keeps separate — the discrete (knots, Skyrme, Faddeev–Niemi) and the continuous (condensate, Volovik, Sakharov) — by the standard device of every condensed-matter course: microscopic structure below, effective medium above. Transformation, not invention.

## 7. The axioms: the foundational paper, August 2026

On 6 August 2026 the accumulated steps were compressed into five axioms: strand, closure, memory, context, scale. The foundational paper went through five editions in one day, under four adversarial review rounds by another AI system, each round and each repair documented. By the ninth of August a sixth edition added the ternary ground.

Every theorem in that paper leans on mathematics that predates it. The trefoil is proved nontrivial by tricolorability — Fox's three-coloring, standard since the 1960s. The  $4\pi$  periodicity of spin comes from the double cover of the rotation group, demonstrated with Dirac's belt. The nilpotent condition  $Q^2 = 0 \iff E^2 = p^2 + m^2$  is Rowlands' published algebra in a Clifford fragment. The constitutive theorem is two derivatives of an energy density, the Murnaghan move again. The entropy theorem is Clausius and de Groot–Mazur, repaired in review when the first edition overreached. The paper's own five-status ledger — assumed, conditionally proved, corresponded, predicted, open — marks precisely which statements are transformations of known results (most of them) and which are open calculations (three, later four).

The ternary ground closed an eighteen-year loop. The 2008 blog post had conjectured the trinity as the grammar. The 9 August 2026 edition derived it: the crossing has three states (over, under, none); base three is the cheapest radix, by the computed economy  $r/\ln r$  ( $2/\ln 2 = 2.885$ ,  $3/\ln 3 = 2.731$ ,  $4/\ln 4 = 2.885$ ); balanced ternary makes negation a mirror-flip and rounding a truncation, as Knuth records and as the Soviet Setun machine computed in 1958. Theorem T7 — every closed winding has a unique address — is then elementary counting in that register. A conjecture of 2008, redeemed by number theory of 1958 and earlier. Nothing new; something old, finally used.

## 8. The comma and the ladder: September 2026

The last derivation step produced the theory's motor, and it is a theorem, not a postulate.

The net counts in two languages at once. The address layer counts in threes; the tension layer counts in twos. Joint closure requires  $3^p = 2^q$  — that is,  $\log_2 3 = q/p$  rational. But  $\log_2 3 = 1.5849625\dots$  is irrational. So exact joint closure is impossible, and the stable depths are the best rational approximations: the convergents of the continued fraction  $[1; 1, 1, 2, 2, 3, 1, 5, 2, 23, \dots]$ , namely  $1/1, 2/1, 3/2, 8/5, 19/12, 65/41, 84/53, 485/306$ . The denominators — 2, 5, 12, 41, 53, 306 — are the ladder of allowed depths. Between rungs, nothing is stable.

Every rung leaves a remainder, and rung 12 has been audible for twenty-five centuries:  $3^{12} = 531,441$  against  $2^{19} = 524,288$  gives 1.013643 — the Pythagorean comma, the 1.36 percent by which twelve fifths overshoot the octaves. Every piano tuner distributes it; no tuning removes it. The essay "Why The Universe Has a Lot of Time" (constable.blog, 3 September 2026) draws the consequence: a net that closed exactly would stop. Because the remainder never settles, every closure hands a residue to the next depth, and the universe — currently on rung 306 — keeps running.

Here too, current physics had the mathematics on the shelf. Mode-locking theory says coupled incommensurate oscillators lock onto the convergent hierarchy — the devil's staircase, measured in circle maps, fluids and junctions in the 1980s. The KAM theorem says the most irrational ratios survive perturbation while rational neighborhoods break up — the Kirkwood gaps display it in the sky. The transformation of September 2026 was to apply that known structure to one specific pair of counts, 3 against 2, address against tension, and to read the result as the timetable of the vacuum. "The History of the Vacuum" (13 September 2026) then showed that the ancient calendar builders ran the same computation — Meton's 19 years as 12 plus 7, the Saros remainder of eight hours

closed by the Exeligmos one rung up — which is exactly what one expects if the ladder is real and old, and nothing at all if it was invented last month.

## 9. The derivation in one table of moves

Six dated moves, six sources, six transformations.

December 2020: the inventory — current physics collected, nothing selected. July 9, 2026: the thread — the field drawn as a line (QFT, Volovik, Sakharov, Cahill, Rowlands). July 26, 2026: the subtraction — fifty-eight assumptions audited, five terminal ones removed; the action principle reclassified as an external standard and replaced by fixed-point closure (Rosen, Banach). July 28, 2026: the inversion — loading–discharge read as the general form, with ENSO as the instrumented layer (Jin, Zebiak–Cane, Bak). July 29, 2026: the constitutive reading — the rotation-curve function read as a stress–strain curve,  $g = g(\chi)$ ,  $a_0 = cH_0/2\pi$  as crossover (Milgrom, Bogoliubov, Murnaghan). August 6–9, 2026: the compression — five axioms, theorems anchored in tricolorability, the  $SU(2)$  double cover, Clifford algebra and radix economy; the 2008 trinity conjecture redeemed (Fox, Dirac, Rowlands, Knuth, Setun). September 2026: the timetable — the ladder as convergents of  $\log_2 3$ , the comma as motor (Khinchin, mode-locking, KAM).

Read the right-hand sides. There is not one item on them that postdates the derivation. The theory is the left-hand column: a set of renamings and re-aimings of the right. That is what a transformation is.

## 10. Where the applications come from

The applications now explain themselves. Each instrument built on the theory is a known device, re-aimed by one of the six moves. The blog documents each as it went live.

The loading gauges — the yearly-scale credit layer and the daily-scale market layer, both blind-tested — are the July 28 inversion, engineered. They contain the physics of the sandpile and the recharge oscillator, pointed at ledgers instead of at the Pacific. Their three empirical laws (loading reads discharge, never price; information flows only from deep to shallow; each layer warns on its own closure horizon) are the standard behavior of every self-organized critical system, stated once and reused.

The MAZE encoder — 3.6 million entries, addresses computed from content in the register  $\{-1, 0, +1\}$  — is the August 9 move, engineered. Its arithmetic is Setun's (1958); its architecture of content-as-address in a vast, mostly empty space is Kanerva's sparse distributed memory (1988), derived independently from high-dimensional mathematics. The encoder's own falsification test is the September move made operational: it currently runs at depth 19, and if the archive grows past that rung's capacity it must jump to 41 or 53, because those are the next convergent denominators. Any stable depth in between kills the law. That is a Shapiro-step experiment — mode-locking used as a ruler, as national metrology institutes use it daily for the volt — run on stored knowledge instead of on a junction.

The MAZE-Bank — deeds confirmed by the counterparty, open positions decaying to rest, chains closing over multiple parties — is the closure axiom, engineered. Its clearing rule is hawala's, centuries old; its three-state position (owed, owing, rest) is the trit; its refusal to book a "violation" state is closure bookkeeping applied to obligations. Read afterwards against deontic logic, it turned out to occupy known formal ground (Hohfeld's relations, constitutive rules) with three mechanisms

the literature lacked — decay, countersigned fulfilment, chain closure — all three of which are re-projections of net rules, not additions to them.

And the constitutive program points at laboratory practice that already exists. Feshbach resonances dial an interaction constant with a magnetic field. Metamaterials assign effective constants point by point. Analog-gravity condensates build effective metrics and measure their horizon radiation. In the transformed projection these are all one activity — setting the state variable  $\chi$  locally and letting  $g(\chi)$  follow — which is why the theory can specify next instruments without inventing phenomena: read the local state of the vacuum from the local values of its "constants," as acoustoelastic testing reads stress in steel from sound speed.

The pattern is uniform because it must be. A derivation that only transformed the known can only yield applications that re-aim the known. The instruments are the proof that the transformation is not empty: the same six moves that produced the axioms produce working machinery, on schedule, with published test conditions.

## 11. Status

Three claims, three statuses. That the derivation ran through the dated steps above: fact — every step is a dated document on constable.blog, downloadable. That each step transformed rather than added: checkable — Section 9 pairs every move with its pre-existing sources, and the reader can verify that nothing on the source side postdates the move. That the projection will keep yielding instruments: extrapolation, with two named tests running — the encoder's forced depth jump ( $19 \rightarrow 41$  or  $53$ , any other stable depth falsifies) and the continued blind performance of the two loading gauges. The foundational paper's open calculations (the coarse-graining that must produce the rung structure, the origin of  $2\pi$ , the dimension of stable closure) remain open and are marked as such in its own status ledger. Nothing in this essay depends on their outcome. The derivation stands on the record.

## Annotated references

### The record itself (constable.blog, in derivation order)

**Konstapel, J. (2020). "The Simple Geometry of the Big Transformation." constable.blog, 7-12-2020.** Why read? The warehouse: current physics, standard and abandoned, collected without selection — Rowlands, Kauffman, Cahill, Bohm, the trinity conjecture. Everything the later derivation selects from is already on these shelves. Reading advice: read chapter 0 and the "History of this Blog" section; the rest is inventory.

**Konstapel, J. (2026). "The Strand That Knots Itself" and the working papers (Place Before Object; Place, Path, Rewrite; Orientation Before Place). 9-7-2026.** Why read? Transformation one, executed: the field drawn as a thread, with place, orientation and object derived from knotting instead of assumed.

**Konstapel, J. (2026). "The Assumptions Nobody Declares." 26-7-2026.** Why read? The selection instrument: fifty-eight undeclared assumptions of current physics, five terminal, thirty-two rooted in the external measuring rod. The document that turned the method into subtraction.

**Konstapel, J. (2026). "Fractal Context Dynamics." constable.blog, 25-7-2026.** Why read? The instructive failure: right content (the context principle survives as axiom N4), wrong direction (axioms first). Abandoned within a day, and the abandonment fixed the method.

**Konstapel, J. (2026). "The Vacuum as Weather." 28-7-2026.** Why read? The inversion step: ENSO's loading–discharge machinery read as the general form of the vacuum, with climate as the best-instrumented layer of the net.

**Konstapel, J. (2026). "The Constitutive Equation of the Vacuum Condensate." constable.blog, 29-7-2026.** Why read? The central equation:  $g = g(\chi)$  derived with sixty-year-old Bogoliubov machinery, the rotation-curve function read as a stress–strain curve,  $a_0 = cH_0/2\pi$  as crossover.

**Konstapel, J. (2026). "The Vacuum.Net Theory: Foundational Paper," editions 1–7. First edition 6-8-2026; ternary ground added 9-8-2026.** Why read? The compression: five axioms, theorems with their five-status ledger, four documented adversarial review rounds. Reading advice: Part II, "The Ternary Ground," is self-contained and shows the 2008 conjecture redeemed.

**Konstapel, J. (2026). "Why The Universe Has a Lot of Time." constable.blog, 3-9-2026.** Why read? The motor: the comma as the unsettleable remainder, the ladder of depths, the universe on rung 306.

**Konstapel, J. (2026). "The History of the Vacuum." constable.blog, 13-9-2026.** Why read? The historical cross-check: the calendar builders as convergent computers — Meton's 12 plus 7, the Saros remainder closed one rung up — exactly what an old, real ladder predicts. Reading advice: start at the status ledger, section 10.

## **The sources each step transformed**

**Rowlands, P. (2007). *Zero to Infinity: The Foundations of Physics*. World Scientific, Series on Knots and Everything.** Why read? Zero totality and the nilpotent algebra  $Q^2 = 0$  — the rewrite-system reading of physics that the strand axioms inherit. Already central in the 2020 inventory.

**Cahill, R. T. (2005). *Process Physics: From Information Theory to Quantum Space and Matter*. Nova Science.** Why read? Space as a self-referential fractal network — the first net picture, drawn by a physicist, and quoted at length in the 2020 post.

**Kauffman, L. H. (1991). *Knots and Physics*. World Scientific.** Why read? The toolbox behind the closure theorems: knot invariants, tricolorability, state sums. Reading advice: Part I is self-contained.

**Spencer-Brown, G. (1969). *Laws of Form*. Allen & Unwin.** Why read? The calculus of a single distinction — the formal grammar of "the thread crosses or it does not."

**Williamson, J. G. & van der Mark, M. B. (1997). "Is the electron a photon with toroidal topology?" *Annales de la Fondation Louis de Broglie* 22, 133.** Why read? Closure applied to the best-measured particle: the electron as light on a closed double loop. The logic the theory generalizes.

**Volovik, G. E. (2003). *The Universe in a Helium Droplet*. Oxford University Press.** Why read? The published case that a laboratory condensate reproduces effective metrics, gauge fields and horizons — the "medium" half of the hierarchy fixed on 29 July.

**Sakharov, A. D. (1967). "Vacuum quantum fluctuations in curved space and the theory of gravitation." *Doklady* 177, 70.** Why read? Gravity as vacuum elasticity, in two pages. The oldest anchor of the constitutive reading.

**Rosen, R. (1991). *Life Itself*. Columbia University Press.** Why read? Closure of the causal chain as the replacement for the external driver — the source of the fixed-point move that retired the action principle on 2 August.

**Jin, F.-F. (1997). "An equatorial ocean recharge paradigm for ENSO. Part I." *Journal of the Atmospheric Sciences* 54, 811–829.** Why read? The recharge oscillator: the best-instrumented loading–discharge system on Earth, and the model whose form was generalized on 28 July.

**Bak, P., Tang, C. & Wiesenfeld, K. (1987). "Self-organized criticality." *Physical Review Letters* 59, 381.** Why read? Slowly driven, suddenly released, power-law sized — the standard physics inside every loading gauge of Section 10.

**Milgrom, M. (1983). "A modification of the Newtonian dynamics as a possible alternative to the hidden mass hypothesis." *Astrophysical Journal* 270, 365.** Why read? The measured crossover  $a_0$  and the noted coincidence with  $cH_0$  — the fact the constitutive step re-reads instead of explains away.

**Fox, R. H. (1962). "A quick trip through knot theory." In *Topology of 3-Manifolds*, Prentice-Hall.** Why read? Tricolorability — the three-coloring that proves the trefoil nontrivial, and the oldest three-state register in the mathematics the axioms use.

**Knuth, D. E. (1997). *The Art of Computer Programming*, Vol. 2, §4.1.** Why read? Balanced ternary — "perhaps the prettiest number system of all" — with the mirror-negation and truncation-rounding properties theorem T7 relies on.

**Hayes, B. (2001). "Third Base." *American Scientist* 89, 490–494.** Why read? The radix-economy computation  $r/\ln r$  in full, the case for base three, and the story of the Setun machine. Ten pages; everything the ternary step needs.

**Brusentsov, N. P. & Ramil Alvarez, J. (2011). "Ternary Computers: The Setun and the Setun 70." Springer.** Why read? The built proof: balanced-ternary hardware, Moscow, 1958. The encoder's arithmetic has run before.

**Khinchin, A. Ya. (1964). *Continued Fractions*. University of Chicago Press.** Why read? Best rational approximation, complete: why the convergents of  $\log_2 3$  are the only candidate depths and nothing between them qualifies. Reading advice: chapters I–II carry the ladder.

**Jensen, M. H., Bak, P. & Bohr, T. (1983). "Complete devil's staircase... in the circle map." *Physical Review Letters* 50, 1637.** Why read? Mode-locking onto the convergent hierarchy, measured — the standard-physics form of the ladder, a decade before it was needed here.

**Arnold, V. I. (1963). "Proof of a theorem of A. N. Kolmogorov..." *Russian Mathematical Surveys* 18, 9.** Why read? KAM: irrational ratios survive, rational ones resonate and break — with the Kirkwood gaps as the sky's demonstration. Reading advice: read a modern exposition first.

**Kanerva, P. (1988). *Sparse Distributed Memory*. MIT Press.** Why read? Content as address in a vast, mostly empty space — the encoder's architecture, derived independently in 1988 from high-dimensional mathematics. Reading advice: the first three chapters give the structure.

**Chin, C., Grimm, R., Julienne, P. & Tiesinga, E. (2010). "Feshbach resonances in ultracold gases." *Reviews of Modern Physics* 82, 1225.** Why read? Dialing an interaction constant with a magnetic field, as laboratory routine — the existing practice the constitutive program re-aims.

**Shapiro, S. (1963). "Josephson currents in superconducting tunneling." *Physical Review Letters* 11, 80.** Why read? Mode-locking used as a ruler — the voltage steps that define the volt. The template for the encoder's depth-jump test.