One Closed Strand: Cosmology Read Through the Vacuum.Net Compression

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Abstract

The Vacuum.Net Theory is not a new rival to physics. It is a compression of existing theory: one closed strand, three values (−1, 0, +1) with sum zero, and one rule — what closes persists, what does not close passes on. If all theory is fractal, the same rule must reappear at every scale. This article tests that claim on one field: cosmology and astronomy.

We proceed in six steps, each starting from the previous one. Step 1 asks what happens if there is no beginning. Step 2 reads redshift as a ratio of depths along the strand. Step 3 reads the cosmic background radiation as the unclosed remainder of the whole strand. Step 4 reads the cosmic web as the three-trit cube placed in space. Step 5 reads stars as knots that do not close at their own scale. Step 6 reads black holes as windings that close everywhere, and the little red dots seen by the James Webb Space Telescope as black holes in a closure phase without a rotation plane.

We treat three cosmologies as open possibilities, not as settled answers: the Big Bang of standard cosmology, an infinite or eternal universe, and a closed strand without beginning or end. For each we give the evidence its defenders cite. The compression does not need to defeat the Big Bang reading. It reads the same numbers — the factor 1 + z, the temperature of 2.725 K, the voids and filaments, the weak X-rays of the red dots — as consequences of one rule.

The article ends with statements astronomers can check, and with what remains to be unpacked. An annotated reference list connects each step to the literature it draws on.

1. Introduction: a fight about red dots

On 5 November 2026 the Dutch newspaper de Volkskrant reported a "fairly intense fight" among astronomers [1]. The subject: small red dots that appear on almost every deep image of the James Webb Space Telescope. Jorryt Matthee, who named them "little red dots" in 2023, says a new paper about them appears almost every day [1, 2].

The facts are not in dispute. The dots are compact. They are red. Their hydrogen lines are strongly broadened. They show almost no X-rays and almost no variability [2–6]. They are common at redshifts of roughly 4 to 8 and rarer later [2, 3, 7].

The interpretation is in dispute. Five readings are on the table:

1. Compact, massive galaxies that should not yet exist: the "universe breakers" of 2023 [8].
2. Ordinary active galactic nuclei seen through a dusty torus, defended among others by Karina Caputi [1].
3. A "black hole star": a black hole inside a dense, nearly spherical shell of hydrogen, proposed by Anna de Graaff and Rohan Naidu after the objects "The Cliff" and MoM-BH*-1 [9, 10].

4. Young, low-mass black holes in a dense ionized cocoon, where electron scattering broadens the lines and the masses drop by a factor of about one hundred [11, 12].
5. Supermassive stars or quasi-stars, with no fully formed black hole yet [13–15].

The dispute even reaches simple counting. One group says there are many more red dots than blue dots; another says the reverse [1]. Every side appeals to Ockham's razor. As Matthee puts it, what counts as "least exotic" is subjective [1].

This article does not choose a side. It asks a different question. Suppose existing theory can be compressed into one rule. Then the same rule must describe the red dots — and the whole of cosmology around them. We test this by deriving cosmology step by step from the first distinction, and by reading each observation in the language of the compression.

The question is not "who is right". The question is whether the observations can be written in this language, and what follows if they can.

2. The compression

The Vacuum.Net Theory compresses existing theory into one strand and one rule. Its formal statement is the Ninth Edition (Foundations 9.2 and Physics 9.0, 27 October 2026) [19]. Theorem numbers below refer to it.

2.1 The ground statements

- **One strand.** There is exactly one strand. Every distinction is a loop: the strand returns to a place it has been (N1).
- **Light.** Light is a location on the strand and moves with the speed of light. There is no medium. There is only the path that light takes along the windings.
- **Ratios.** Length and time are not variables of the universe. They are human reference points, calibrated on the day cycle of sun and moon. Everything measured is therefore a ratio.
- **Complexity.** The only source of complexity is that the strand is wound. A winding is a knot.

2.2 The trinity and closure

Beneath the axioms lies one ground: three values −1, 0, +1 whose sum is zero. They are the digits of balanced ternary [19]. A sum of trits keeps its residue modulo 3 at its own scale and passes the rest on as a carry to the next scale (T1).

The shortest return that goes round takes three steps. A window is therefore three trits (T2). Of the 27 possible windows, exactly 9 close: those whose three trits are all equal or all different (T3, T4).

The rule of closure (N2): a loop persists if and only if it lies in a closed window. What does not close passes on as tension. There is no external selector.

2.3 Three elementary closures

Every closed trit word reduces to three pieces (T7):

Closure	Pattern	Winding number	Carry to next scale
Standing	0	0	0
Meeting	x, −x	0	0
Ring	x, x, x	±1	±1

A ring closes at its own scale and becomes one passage of the next (T7.1). This is the scale axiom N5 as arithmetic: merged into blocks, the coarse strand obeys the same rules again. What does not close at one scale is the material of the next.

Two more results carry weight in cosmology. A seam between two different closed windows always carries tension; only a seam between equal windows is tension-free (T11). And under the rewrite $R(t)_i = -(t_{i-1} + t_{i+1})$, the rings that close everywhere are fixed points; rings that are not fixed end in cycles (T10, computed for n = 3 to 10).

2.4 Two ladders and the comma

Merging meetings doubles. Merging rings triples. After a merges of meetings and b merges of rings, one coarse passage holds $2^a \cdot 3^b$ finest passages (T15). Since $2^n \neq 3^k$ for all n, k > 0, the two ladders never meet exactly (T16). Their best near-meetings are the closure depths 1, 2, 5, 12, 41, 53, 306, 665, 15601, … — the denominators of the convergents of $\log_2 3$ (T17).

Closure depth k	Comparison	Residue (distance of $2^n/3^k$ from 1)
12	$3^{12} \sim 2^{19}$	1.35 % (the Pythagorean comma, 23.46 cents)
41	$3^{41} \sim 2^{65}$	1.15 %
53	$3^{53} \sim 2^{84}$	0.21 %
306	$3^{306} \sim 2^{485}$	0.10 %
665	$3^{665} \sim 2^{1054}$	0.0044 %
15601	$3^{15601} \sim 2^{24727}$	0.0018 %

Source: [19], T18. The residue never vanishes. The net never closes completely.

2.5 The first knot

In three-dimensional space, three crossings are the least that cannot be undone: the trefoil, which is chiral (T19, T20). A rotor returns to its initial state only after 4π (T21). The Hopf charge is conserved without appeal to Noether's theorem (T22). The electron corresponds to light closed on itself in a double loop, after Williamson and van der Mark (C4, I1) [25].

2.6 Where the compression comes from

The compression is assembled from existing work. The mark of distinction and its re-entry come from Spencer-Brown [20] and Kauffman [21, 22]; Kauffman's eigenform O(A) = A is the formal side of N2. The nilpotent Dirac operator, $Q^2 = 0$ exactly on the mass shell, comes from Rowlands [23]; the compression reads nilpotence as closure (C3). Maxwell wrote his equations with one quaternion product that carries two readings [24]. Larson read space and time as two aspects of one motion [26]. Rosen asked which

dynamics is its own fixed point [30]. 't Hooft's cellular automaton interpretation shares the idea that a simple deterministic rule underlies quantum behaviour [28].

Chaitin supplies the measure: a theory is a program shorter than the data it produces [27]. A compression is good if the data come back out of it.

2.7 All theory is fractal

If all theory is fractal, every theory is a slice of the same pattern at another scale and in other words. This is why one rule can compress them, and why the compression can be rewritten in any theory. N5 states it formally. The test of this article follows directly: if the rule is the pattern, cosmology must come out of it, step by step.

3. Three cosmologies as possibilities

Three pictures of the whole are possible. None is treated here as settled. Each has defenders, evidence and open problems.

3.1 The Big Bang

The standard picture grew from Friedmann's expanding solutions of general relativity [32], Lemaître's link between expansion and redshift [33] and Hubble's distance–velocity relation [34]. It holds that the universe expanded from a hot, dense state about 13.8 billion years ago.

Its defenders cite four lines of evidence:

- **Redshift grows with distance** [34], and distant supernovae run slower by exactly the factor 1 + z [52, 53].
- **The cosmic background radiation** is a near-perfect blackbody at 2.725 K [35, 55, 56]. It was warmer in the past, in proportion to 1 + z [57, 58].
- **The light elements** — hydrogen, helium, traces of deuterium and lithium — match a hot early phase [78].
- **The pattern of fluctuations** in the background radiation fits a six-parameter model with high precision [37].

Its open problems are also well known. The uniformity of the background needed inflation, an added early phase [36]. General relativity predicts its own breakdown at the start, a singularity [73]. Two thirds of the energy budget is "dark energy", whose nature is unknown [38, 39]; DESI now finds hints that it changes over time [40]. And JWST sees massive galaxies and black holes earlier than models expected [8, 77].

3.2 An infinite or eternal universe

The idea of an endless universe is old. Einstein's first cosmology of 1917 was static [31]. The steady-state theory of Bondi, Gold and Hoyle had no beginning: matter was created continuously as the universe expanded [41, 42]. Its successor, the quasi-steady-state cosmology, added cycles [43]. Modern cyclic models replace one beginning with an endless series of bounces [44]. Penrose's conformal cyclic cosmology joins the remote future of one aeon to the beginning of the next [45].

A second family rejects expansion altogether. Zwicky proposed in 1929 that light loses energy on its way — "tired light" [51]. Lerner and colleagues argue that the surface brightness of galaxies fits a static universe better than an expanding one [49]. López-Corredoira lists the tensions in the standard model in detail [50].

The defenders of an endless universe cite the singularity and the need for inflation and dark energy as signs of a wrong premise. Their critics reply with three observations: the blackbody shape of the background radiation [55], the factor 1 + z in supernova durations, which tired light does not produce [52, 53], and the Tolman surface-brightness test as read by Lubin and Sandage [54]. An infinite universe also raises Olbers' old question: why is the night sky dark? [47]. And it implies that every finite configuration repeats infinitely often [46].

3.3 A closed strand

A third possibility is finite but without boundary. Einstein's static universe of 1917 was already closed [31]. Luminet and colleagues proposed in 2003 that space may be a finite dodecahedral space, to explain the weak large-angle correlations in the background radiation [48].

The compression takes this third road, but in a specific form. The universe is one closed strand, with nothing in it but the path of light. Closed means finite in topology. But the process never ends: by the comma, the strand never closes completely (T16–T18). The compression is therefore closed in form and eternal in process.

3.4 How the compression reads the other two

The compression does not need to reject the other pictures. It reads them as two projections of itself.

- **The Big Bang** is the starting point of the observer, projected onto the whole. On a closed strand any passage can serve as the first one (N3, T13). Reading backwards from our position, all windings seem to converge on one start.
- **The infinite universe** is the endless count of passages. The process has no last step, because the residue of the comma is always passed on.

	Big Bang	Infinite / eternal	Closed strand (compression)
Beginning	Yes, 13.8 billion years ago	No	No: a closed configuration has no starting point
End	Open (depends on dark energy)	No	No: the comma never closes
Size	Finite past, possibly infinite space	Infinite	Finite in topology, unbounded
Redshift	Expansion of space	Energy loss or other mechanism	A ratio of depths along the strand (Step 2)
Background radiation	Afterglow of the hot start	Thermalised starlight or other	The unclosed remainder of the strand (Step 3)

	Big Bang	Infinite / eternal	Closed strand (compression)
Main open problem	Singularity, inflation, dark energy	Blackbody shape, supernova durations	Unpacking masses and constants (Section 11)

The next six sections derive cosmology from the compression, one question at a time.

4. Step 1: if there is no beginning, what happens?

Without a beginning, what happens is an endless circulation. Light runs round one closed strand. What closes stands as structure. What does not close cycles and is passed on to deeper layers. Because of the comma, it is never finished.

A closed strand has no starting point. A closed configuration is read without a start. The compression counts it as a rotation class, not as a word with a first letter. The number of such classes of n trits is the necklace count $g(n) = (1/n)\ \Sigma\ \phi(n/d)\ 3^d = 3, 6, 11, 24, 51, 130$ for n = 1 to 6 (T13). "No beginning" is therefore not an extra assumption. It follows from closure.

The "first" is the place of the reader. N3 says that the first passage through a node fixes the direction; later passages are read relative to it. On a closed strand every passage can play that role. The beginning is not an event of the universe. It is the point from which the universe is read. This is how the compression reads the Big Bang (Section 3.4).

Passage itself changes nothing. In the address layer, the only thing that can happen is passage. Any local rule that conserves the balance sum and lets every state return is the identity or a shift. This was checked exhaustively: all 3^{13} = 1,594,323 sign-symmetric rules and all 144 conserving flux-form rules on a ring of five. Light running round the strand is a shift. It changes no address.

What closes stays; what does not close passes on. At each passage, three consecutive trits form a window. A closed window leaves the structure standing (N2). An open window passes its rest on as tension. A closed ring passes ±1 to the next scale (T7.1). So deeper layers form continuously, each from what the layer below could not close (N5).

It repeats in cycles. Under the rewrite R, only rings that close everywhere are fixed points. All others end in cycles (T10). What does not come to rest does not drift without direction. It pulses.

There is no end either. The ladders ×2 and ×3 never meet (T16). There is always a residue, and it is always passed on. A fully closed final state does not exist.

Consequence for cosmology. Cosmology then is not a history from an origin. It is the reading of a cycle from our position inside it. "Earlier" and "later" become "further along the path" and "nearer along the path". This is consistent with the ground statement that time is a human reference, not a variable of the universe (Section 2.1).

Kindred proposals. Cyclic cosmologies [44, 45] also remove the single beginning, but keep a time axis on which cycles follow each other. The compression keeps the cycles and drops the external time axis: the cycle is the strand itself.

5. Step 2: redshift as a ratio of depths

Redshift is the ratio between the number of passages per period there and here. It grows with the number of scale steps along the path, and it applies to every period at once. That is why the colour of a line and the slowing of a supernova are the same number.

What is measured. An astronomer measures a ratio: the wavelength that arrives, divided by the wavelength of the same line here. That number is 1 + z. Nothing more is measured: a ratio of two counts.

A period is a count of passages. Length and time are human reference points (Section 2.1). A wavelength or a period is therefore a number of passages of light, expressed in our own unit.

Each scale step changes the count. A closed ring of three passages becomes one passage of the next scale (T7.1). One coarse passage holds $2^a \cdot 3^b$ fine passages (T15). Light that comes from a place on the path a different number of scale steps away from us has a different count of passages per period. That ratio is 1 + z. In this reading redshift is neither a velocity nor a stretching of space.

Why z can take any value. The ladders ×2 and ×3 never meet, so the combinations $2^a \cdot 3^b$ lie dense on a logarithmic scale (T16, Kronecker's theorem). Every ratio can be approximated. That is why we see a smooth range of redshifts, not discrete jumps.

Why further is redder. Further along the path means more scale steps. Each step multiplies, so the relation is logarithmic:

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\ln(1+z) \propto N_{\text{steps}}
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Nearby, where z is small, ln(1 + z) ≈ z, and this reduces to z proportional to distance: Hubble's law [34], read as a count of the scales passed.

The slow supernovae follow by themselves. This is the observation most often cited for expansion. Distant type Ia supernovae last longer by exactly 1 + z: first shown by Goldhaber and colleagues [52], and confirmed by the Dark Energy Survey out to z ≈ 1.2 [53]. A supernova at z = 1 runs twice as slowly as one nearby. In the compression, 1 + z is a ratio of counts of passages. That ratio applies to every period of the source: to the oscillation of a spectral line and to the duration of a light curve. Nothing needs to stretch.

The difference with tired light. Zwicky's tired light [51] also gives a logarithmic law, but it lowers only the energy of each photon. It leaves durations untouched, and the supernova data reject it [52, 53]. The compression differs at exactly this point. It does not take energy from the light. It changes the count by which every period is read. Frequency and duration therefore change together.

The difference with expansion. In standard cosmology the same factor 1 + z is read as the stretching of space during the light's travel [33, 34]. In the compression it is a difference in depth on one closed strand. The number is the same. The reading differs.

Surface brightness. The Tolman test asks how the surface brightness of galaxies falls with redshift. Lubin and Sandage read it as support for expansion [54]. Lerner and colleagues read it as support for a static universe [49]. The compression predicts that surface brightness, like any period-based quantity, follows the same count of passages. Working out its exact power of 1 + z is a step still to be taken (Section 11).

6. Step 3: the cosmic background radiation

The background radiation is the unclosed remainder of the whole strand, fully mixed and therefore a blackbody. It is the same everywhere because the strand has no centre. Its temperature is a ratio. The small residues of the comma are its small deviations.

What is measured. Light arrives from all directions with one spectral shape: a near-perfect blackbody at 2.72548 K [55, 56], first found by Penzias and Wilson in 1965 [35]. It deviates by about one part in 100,000 from direction to direction [37]. One side of the sky is slightly warmer than the other: the dipole.

A blackbody is the state without preference. When trits are distributed uniformly, a window closes with probability 1/3 (T6). That is the free state, in which no winding dominates. A blackbody is exactly the spectrum of maximal mixing. The background radiation is then what remains when all open passages of all scales are counted together: the rest that closes nowhere (N2), read from our depth. It is not the afterglow of a beginning. It is the background of passing-on itself.

A temperature before 1965. Eddington estimated in 1926 that the "temperature of space", heated by starlight, is 3.18 K [59]. That estimate concerned diffuse starlight, not a cosmic background, but it shows that a few kelvin is the natural floor of a radiating universe without a hot start. The compression reads the floor as the mixed remainder of all scales.

Why it is the same in all directions. A closed strand has no starting point and no centre (T13). No place is special, so the remainder arrives equally from every side. In standard cosmology this uniformity is the horizon problem, solved by adding inflation [36]. In the compression it follows from closure.

Why it was warmer further away. A temperature is a characteristic period, and a period is a count of passages (Step 2). The same ratio therefore applies:

$$T(z) = T_0\,(1+z), \qquad T_0 = 2.725\ \text{K}$$

This has been measured with molecules and atoms in distant gas clouds: at z = 2.34 [57] and at z = 0.89 [58]. At z = 6, the redshift of many little red dots, it gives 2.725 × 7 = 19.1 K. The compression reads this not as cooling over time but as the same ratio of depths that turns lines red.

The dipole. Our own winding has a direction: the first passage fixes it (N3). Whoever reads along the path sees the remainder ahead slightly differently from the remainder behind.

The small deviations. Because of the comma nothing closes completely. At the deep near-closures the residue is 4.4×10^{-5} (depth 665) and 1.8×10^{-5} (depth 15601) (T18). The measured deviations in the background radiation lie around 10^{-5} [37]. This is a numerical correspondence. Deriving the full pattern of the deviations — the angular power spectrum with its acoustic peaks — from the closure depths is still to be done (Section 11).

A finite shape. Luminet and colleagues noted that the background radiation shows weaker correlations at the largest angles than an infinite flat space predicts, and proposed a finite dodecahedral space [48]. A closed strand is finite in topology as well. Whether its geometry leaves the same signature at the largest angles is a question the compression can answer once the depth of our own winding is fixed.

7. Step 4: galaxies and the cosmic web

A galaxy is a knot at galactic scale. The cosmic web is the trit cube placed in space: voids close, walls never, filaments half, nodes only when all three directions agree. Spiral and elliptical galaxies are the two ways of closing.

What is seen. Galaxies are not scattered at random. They form a web of four kinds of environment: voids, walls (sheets), filaments and nodes (clusters) [60, 61]. Voids take about 77 % of the volume but hold less than 15 % of the mass [63, 64]. Filaments and clusters are the most prominent parts of the web [63]. In the standard picture matter flows from voids to walls, from walls to filaments, and from filaments to nodes [60, 61, 63].

The four kinds are the trit cube. Each cell of the cube $\{T, 0, 1\}^3$ has 0, 1, 2 or 3 nonzero coordinates. The numbers of cells are 1, 6, 12 and 8 (T5). Read "nonzero" as "contracted in that direction", and the four kinds of the web appear. Cosmologists use exactly this classification: the T-web counts in how many directions matter is collapsing [62].

Nonzero coordinates	Element of the web	Cells in the cube	Cells that close (T5)	Reading
0	Void	1	1 (the centre)	Stable; largest by volume
1	Wall (sheet)	6	0	Never an end state; passes on
2	Filament	12	6 (opposite signs)	Half stable; carries the flow
3	Node (cluster)	8	2 (all signs equal)	End point of full contraction

Which kinds are stable. The centre closes, so voids are stable and large. No cell with one nonzero coordinate closes, so walls are never end states. In standard cosmology these are Zel'dovich's "pancakes", which collapse further into filaments [60]. Of the cells with two nonzero coordinates, six close: those with opposite signs. Filaments are half stable and carry the flow. Of the cells with three, only two close: those with all signs equal. Nodes are the end point of complete contraction. The sequence void → wall → filament → node is one direction more each time, until the window closes.

A galaxy is a knot at large scale. What does not close at the scale of stars is the material of the scale above (N5). A galaxy consists of stellar windings, and it carries a residue that takes it up into a group, a cluster and the web. At the largest scales the web is the same everywhere, because the closed strand has no centre (Step 3).

Two forms of galaxy. There are two ways to close (T7). A meeting has winding number 0: elliptical galaxies, which hardly rotate as a whole. A ring has winding number ±1: spiral galaxies, with a clear sense of rotation and a handedness in their arms. The compression thus reads the classic division of galaxies as the two elementary closures.

Why the outer parts rotate too fast. At the edge of a galaxy the crossover rule of the compression applies: one full turn per mesh. It gives the acceleration scale $a_0 = cH_0/2\pi = 1.08 \times 10^{-10}$ m s^{-2} for $H_0 = 70$ km s^{-1} Mpc^{-1} (I3) [19]. The scale measured from rotation curves is 1.2×10^{-10} m s^{-2} [65–67]. Below this acceleration the rotation stops falling. Milgrom found the scale empirically in 1983 and noted its closeness to $cH_0/2\pi$ [65]. The compression reads the 2π as one geometric turn per mesh: the passage to the next scale. No dark-matter particle is needed in this reading (P4).

8. Step 5: stars

A star is a knot that does not fully close at its own scale. Its form is what closes; its light is what passes on. Fusion is a deeper closure that releases a remainder, and the cycles of stars are the cycles of rings that are not fixed points.

What is seen. Stars shine long and steadily. In their cores they convert hydrogen into helium. Four hydrogen nuclei (4 × 1.00728 u) become one helium nucleus (4.0015 u); about 0.7 % of the mass is released as energy. Eddington proposed this source in 1920 [68]; Bethe worked out the reactions in 1939 [69]. Heavier elements are built in later stages and in explosions [70]. Many stars pulsate or have cycles; the Sun's activity follows a cycle of about 11 years, found by Schwabe in 1844 [71]. Stars end as white dwarfs, neutron stars or black holes, sometimes through a supernova [72].

A star is a knot that does not close at its own scale. Inside a galaxy (Step 4), a star is a winding whose windows do not all close. What does not close passes on as tension (N2). Shining is that passing-on: the open rest leaves the winding as light. A star is not a fire in space. It is a place where the strand keeps passing on what it cannot close.

Why a star holds together. What closes persists (N2): that is the form of the star. In the compression gravity is a form of electromagnetism. Holding together is then not a separate force. It is the closed windings maintaining themselves. A star is a balance between the part that closes (its form) and the part that passes on (its light).

Fusion: windings that close deeper. Four hydrogen nuclei become one helium nucleus: two merges on the ×2 ladder (2 × 2 = 4, T15). Not everything fits into the new, deeper closure. The part that does not fit, the 0.7 %, is passed on. That is the light of the star.

Why stars pulsate and have cycles. Under the rewrite R only rings that close everywhere are fixed points. Rings that are not fixed end in cycles (T10). A star is such a ring: it does not come to rest but repeats. The solar cycle and the pulsation of variable stars are, in this reading, those cycles.

The end of a star. When the remainder that can be passed on runs out, what remains is what closes:

- a **white dwarf** or **neutron star**: a dense winding that closes almost everything;
- a **black hole**: a fully closed deep winding, silent because it passes nothing on (Step 6);
- a **supernova**: the sudden release of tension held in the seams between windings that do not match (T11).

What is not yet unpacked here. Why luminosity rises so steeply with mass, and why stars lie between roughly 0.08 and 150 solar masses. For this, the depth of a winding must be tied to its rate of passing on (Section 11).

9. Step 6: black holes and the little red dots

A black hole is a winding that closes everywhere and is therefore silent; its light comes from the seam around it. The little red dots are black holes in the meeting phase, without a rotation plane: spherical, quiet, intrinsically red, and lighter than the line-width rule suggests. When they acquire a sense of rotation, they become ordinary active nuclei with a disk, jets and X-rays.

9.1 Black holes

A black hole is a winding that closes everywhere. A ring in which every window closes is a fixed point of the rewrite (T10). It reproduces itself and passes nothing on. What passes nothing on does not radiate. That is why a black hole is dark. It is not a hole, and there is no point of infinite density. It is the deepest rest of the strand. General relativity, by contrast, predicts a singularity once collapse begins [72, 73].

The horizon is a seam. Around the closed winding lies open strand. A seam between two different windings always carries tension; only a seam between equal windows is tension-free (T11). All the light we see near black holes — the ring imaged by the Event Horizon Telescope [74, 75], the glowing matter around it, the jets — comes from that seam, not from the black hole itself. Mazur and Mottola's gravastar, a compact object without singularity whose interior is in a different state from its exterior, is a kindred picture in the language of general relativity [76].

Two kinds of closure, two kinds of black hole. There are two ways to close (T7):

Closure	Winding number	Rotation plane	What it produces
Meeting (x, −x)	0	None: spherical	A quiet, compact object
Ring (x, x, x)	±1	Yes	A disk, jets along the axis, X-rays where the disk discharges: an ordinary active nucleus

9.2 The little red dots as the meeting phase

Each observed property of the red dots now has a place.

- **Compact.** The winding is deep. Most red dots are unresolved even by JWST [2, 3].
- **A sphere, not a torus.** A meeting closure has no rotation plane. This matches de Graaff's and Naidu's nearly spherical, dense hydrogen envelope [9, 10] better than Caputi's dusty torus [1]. Their own estimate supports the scale: a star-like photosphere of 5000–5800 K radiating 10^{10}–10^{11} solar luminosities has a radius of about 460–1960 AU (calculation for this article), far beyond Pluto's 40 AU, as de Volkskrant reports [1].
- **Quiet: no X-rays, no flicker.** X-rays and variability belong to the discharge of a rotating disk. Without a rotation plane there is no disk. Deep stacking finds the red dots X-ray weak [5, 6]. Their radio emission is weak as well [11]: there are no jets.
- **Red in themselves.** Light from the seam passes through many closed layers. Each layer changes the count of passages (Step 2), so the light leaves redder. This is the same rule as cosmological redshift, applied locally. In the standard picture the same effect is attributed to absorption in dense gas, which also produces the strong Balmer break [9, 16].
- **Broad hydrogen lines.** In a thick seam the light runs through many neighbouring depths. Rusakov and colleagues call it electron scattering: repeated passage [11]. Sneppen and colleagues reproduce the spectra this way and find the predicted correlations between break strength and line width [12].

9.3 The masses

In the compression mass is depth: the number of windings. The astronomers' rule of thumb reads line width as velocity and velocity as mass; mass scales with velocity squared, so a factor 10 in width is a factor 100 in mass. In a thick seam the width comes from passages, not from velocity. The rule then overestimates the mass. This is what Rusakov and colleagues found: black holes about a hundred times lighter than first estimated, among the least massive known at high redshift [11]. Sneppen and colleagues find typical masses of order a million solar masses [12]. Nemmen notes that the result depends on how much ionised gas the cocoon holds [17].

A check on scale: the Eddington luminosity of a black hole of 10^6 solar masses is about 1.3×10^{37} W, or 3.3×10^{10} solar luminosities (calculation for this article). This matches the brightness of the red dots and the conclusion that they grow close to the Eddington limit [11].

9.4 Why they were common "early"

"Early" is "further along the path" (Step 2). The meeting phase is a transition. A winding stays silent and closed, or it acquires a sense of rotation and becomes an ordinary active nucleus. Or its open remainder grows into a blue galaxy around it. Matthee points out the asymmetry: a red dot can hide in a blue galaxy, but a blue dot cannot hide in a red one [1]. N5 states the same: the closed core can sit inside the open rest of the next scale, not the reverse.

9.5 Chicken or egg

De Graaff asks which came first, the black hole or the galaxy [1]. In the compression neither came first. The black hole (the closed core) and the galaxy (the open rest at the next scale) are one knot at two scales. They arise together. Quasi-star models [13, 14] and supermassive-star models [15] describe this joint arising in the language of stellar structure.

9.6 What follows

The reading yields a statement astronomers can check: **as soon as a little red dot shows net rotation or jets, X-rays must appear.** A red dot with a clear rotation plane and no X-rays would contradict the meeting-phase reading.

10. Statements astronomers can check

The compression yields six statements that existing or planned data can address. Each follows from a step above; each states what would contradict it.

Statement	From	Data that can check it	What would contradict it
Rotation or jets in a little red dot come with X-rays	Step 6	JWST integral-field kinematics with Chandra or future X-ray missions [5, 6]	A red dot with a clear rotation plane and no X-rays
Every period of a source shifts by the same 1 + z	Step 2	Supernova light curves and spectra in one sample [52, 53]	A duration factor that differs from the spectral 1 + z

Statement	From	Data that can check it	What would contradict it
ln(1 + z) grows in proportion to the number of scale steps along the path	Step 2	Distance indicators that do not assume an expansion model	A relation that cannot be written as a count of scale steps
The background temperature follows $T_o(1 + z)$ at every redshift	Step 3	Molecular and atomic thermometers in distant clouds [57, 58]	A departure from the linear law
Walls are never end states; filaments and nodes are	Step 4	Cosmic-web catalogues by T-web or NEXUS [62–64]	Long-lived, stable walls with no flow into filaments
The acceleration scale is $cH_o/2\pi$	Step 4	Rotation curves with an independent H_o [65–67]	A scale that does not track H_o

The first statement is the sharpest for the current debate. De Graaff's team has new JWST observations planned [9]. Posting the statement, dated, before those results appear is the strongest form of exposure.

11. What remains to be unpacked

A compression is complete when the data come back out of it [27]. Seven unpackings are still to be done for cosmology. The Physics document of the Ninth Edition names the related open calculations O1 and O3–O8 [19].

1. **The light elements.** Standard cosmology predicts about 75 % hydrogen and 25 % helium by mass, with traces of deuterium and lithium [78]. The compression must give these ratios as closure depths.
2. **The pattern of the background deviations.** The angular power spectrum with its acoustic peaks [37] must follow from the closure depths, not only the overall level of 10^{-5} (Step 3).
3. **The surface-brightness law.** The exact power of 1 + z with which surface brightness falls, which decides the Tolman test [49, 54].
4. **The mass spectrum and the constants.** The proton–electron mass ratio of 1836, the fine-structure constant α and the Hubble constant (O3, O7, O8).
5. **Luminosity and mass of stars.** Why stellar luminosity rises so steeply with mass, and why stars lie between about 0.08 and 150 solar masses (Step 5).
6. **The depth of our own winding.** The reading position fixes the dipole, the largest-angle signature of a finite strand [48] and the zero point of all redshifts.
7. **Gravity as electromagnetism.** The orbital laws of planets and stars must come out of the closed windings, without a separate force.

12. Conclusion

One rule — what closes persists, what does not close passes on — reads the whole of cosmology in six steps. Without a beginning, light circulates on a closed strand. Redshift is a ratio of depths, and it stretches every period at once. The background radiation is the mixed remainder of all scales. The

cosmic web is the trit cube in space. Stars are knots that do not close at their own scale. Black holes are windings that close everywhere, and the little red dots are black holes in their meeting phase.

The Big Bang and the infinite universe remain possibilities. The compression reads them as projections of a closed strand: the Big Bang as the start of the reader, the infinite universe as the count that never ends. The three pictures share the same numbers. They differ in what the numbers mean.

The astronomers in de Volkskrant agree on one thing: the data are the data [1]. The compression agrees. What it adds is a single rule under which those data belong together — and a dated statement about the next data to come.

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