

COHERENT LUMINOUS NODE MULTI-STATE HYPOTHESIS REPORT

Anchor memory, environmental replenishment, directional venting,
microwave fireballs, colour-state transitions, and barrier re-formation



Blue/violet ring state - user-supplied online
screenshot



Later orange/yellow-dominant state - same
online source

Status. Speculative hypothesis synthesis and adversarial computational record. The report does not claim that natural ball lightning has been explained, does not identify the mechanism in any online video, does not establish gravity control, propulsion, fusion, or free energy, and intentionally omits hazardous construction parameters. Published microwave-plasma experiments are treated as independent conventional-physics comparators, not as proof of RBFL.

Scientific boundary

This report separates five evidence classes throughout:

- **[LITERATURE]** peer-reviewed or published laboratory/natural observations;
- **[MODEL]** normalized RBFL/CLN reduced-order computational results;
- **[UNVERIFIED MEDIA]** online media observations whose provenance/authenticity is unresolved;
- **[HYPOTHESIS]** mechanistic interpretations that remain to be tested;
- **null/falsifier:** an explicit condition expected to weaken or reject a hypothesis.

No online screenshot is treated as proof. No normalized model coefficient is presented as a physical volt, ampere, kelvin, pascal, newton, metre, or thrust value.

Executive statement

The current CLN programme has reached a point where a detailed hypothesis report is scientifically useful because the same qualitative picture has survived multiple independent mathematical attacks while external plasma literature provides several conventional-physics analogues. The strongest internal result is not that one specific burden variable is correct; it is that **persistent, spatially local boundary loading produces a distinctive migration response that matched non-spatial rivals do not reproduce**. A separate fresh-medium/global-relief model can reproduce the aggregate survival rescue, however, so environmental replenishment remains a live rival. A third layer shows that if processed medium exits through a preferred inter-anchor gap, ordinary momentum conservation is sufficient to generate opposite recoil in the model.

A major external convergence emerged after these hypotheses had been developed: Ohtsuki and collaborators published microwave-generated plasma fireballs in natural air, barrier passage through a ceramic plate, unusual mobile/stable fireball behaviour, and a later experiment in humid air containing water droplets and vapour in which the luminous objects *grew and shifted toward red* relative to the dry case [1, 2, 5]. A separate natural spectroscopic observation recorded a 1.64-s ball-lightning event whose colours evolved through purple, orange, white and red while soil-element emission persisted through its lifetime [6]. These publications do not prove the CLN mechanism, but they make the multi-state/environment-dependent interpretation a serious hypothesis rather than a purely visual analogy.

Current synthesis in one sentence

CLN is best treated as a family of bounded luminous plasma/field attractors whose formation, survival, colour state, transport, venting and apparent barrier passage can depend on different environmental support channels; the same visible “orb” need not have one universal microscopic mechanism.

Contents

1	Scope, claim ladder, and what is frozen	3
1.1	The CLN branch does not modify the RBFL gravity law	3

1.2	Conventional null model first	3
1.3	Claim ladder	3
2	From a single orb to a multi-attractor framework	3
3	Observational trigger: two bright anchors and a blue-to-orange transition	4
4	v0.13-v0.15: the two-anchor migration result and its numerical hardening	5
4.1	Local burden hypothesis	5
4.2	Break-test result	6
4.3	Continuum boundary formulation	6
5	v0.16: removing the symbol H	6
5.1	Thermal-memory surrogate	7
5.2	Signed charge/attachment-memory surrogate	7
5.3	Saturating deposition/coverage surrogate	7
6	v0.17: matched non-spatial rivals	8
7	v0.18: fresh-medium replenishment as a serious critic rival	8
8	v0.19: inter-anchor exhaust and ordinary recoil	9
8.1	Decisive observational prediction	10
9	What the user-supplied outdoor frames do and do not show	11
10	Microwave fireballs: the strongest conventional laboratory bridge	11
10.1	1991 Nature result	11
10.2	1997 humidity experiment	11
10.3	1998 unusual-motion and field-mode work	11
10.4	Barrier passage as field-supported persistence or re-formation	12
11	Blue, orange and microwave-supported states: a cautious state map	12
12	Multi-environment attractor matrix	13
13	A unified hypothesis without overclaiming	13
14	What is actually strengthened by the published literature	13
15	Falsification programme	14

15.1 F1 - anchor-gap/plume/recoil sequence	14
15.2 F2 - crossed anchor redistribution $\times$ fresh-medium replacement	14
15.3 F3 - colour is not enough	15
15.4 F4 - barrier passage	15
15.5 F5 - online-video provenance	15
16 Recommended next work: observation first, then low-energy analogue	15
17 Current verdict	16
Appendix A - Reproducibility ladder and package hashes	17
Appendix B - Symbol dictionary	17
Appendix C - External literature	18
Appendix D - Media provenance note	18

1 Scope, claim ladder, and what is frozen

1.1 The CLN branch does not modify the RBFL gravity law

The CLN work is an engineering/explanatory sandbox layered outside the locked RBFL acceleration architecture. None of the v0.2-v0.19 variables below is inserted into the gravitational force law. In particular, anchor burden, fresh-medium supply, aperture opening, vapour/mass flux, colour state and recoil are not gravity terms.

The foundational CLN diagnostic remains a state-classification quantity:

$$\boxed{\mathcal{N}_{\text{CLN}} = R_\phi L_\Omega S_T} \quad (1)$$

where R_ϕ measures phase/coherence organisation, L_Ω localisation, and S_T bounded temporal persistence. A high value is a *candidate coherent-node state*, not a claim of a new force.

1.2 Conventional null model first

The minimum physical interpretation of the current CLN results is conventional:

$$\boxed{\text{electromagnetic/plasma dynamics} + \text{boundary conditions} + \text{environment} + \text{feedback}} \quad (2)$$

Any specifically RBFL phase-coupling interpretation must beat that conventional model in a future experiment. The present report therefore gives conventional plasma/EM explanations equal standing wherever they can explain the same observation.

1.3 Claim ladder

Level	Allowed statement	Current status
C0	A reduced-order equation can reproduce a declared behaviour.	Achieved for several CLN behaviours.
C1	The behaviour survives adversarial nulls and alternative equations.	Achieved for local-memory migration class.
C2	Independent conventional experiments show analogous behaviour.	Partly achieved: microwave fireballs, humidity effects, barrier passage.
C3	A specific natural/online event matches frozen predictions.	Not yet achieved; source video needed.
C4	The physical mechanism is identified experimentally.	Not achieved.
C5	A safe laboratory analogue is independently reproduced.	Future work.

2 From a single orb to a multi-attractor framework

A single visual category called “ball lightning” can hide different physical states. The synthesis used here is:

$$\dot{\mathbf{X}} = \mathbf{F}_{\text{CLN}}(\mathbf{X}, \mathbf{u}; \mathbf{E}), \quad (3)$$

where $\mathbf{X}$ is the frozen CLN state vector, $\mathbf{u}$ represents allowed control/sustainer variables, and $\mathbf{E}$ is an environmental vector. Different environments may select different bounded attractors:

$$\mathbf{X}(t) \longrightarrow \mathcal{A}_k(\mathbf{E}), \quad k = 1, 2, \dots \quad (4)$$

without requiring a different core law for every visible behaviour.

A useful environment vector is

$$\mathbf{E} = \{\rho_{\text{drop}}, q_v, \sigma_{\text{air}}, \sigma_{\text{surface}}, \mathbf{v}_{\text{air}}, \mathcal{G}_{\text{EM}}, A_{\text{acoustic}}, \text{attachment topology}\}. \quad (5)$$

The components are deliberately generic. They allow wet/droplet-supported, dry/indoor, conductive-surface, field-guided and acoustically perturbed branches to coexist.

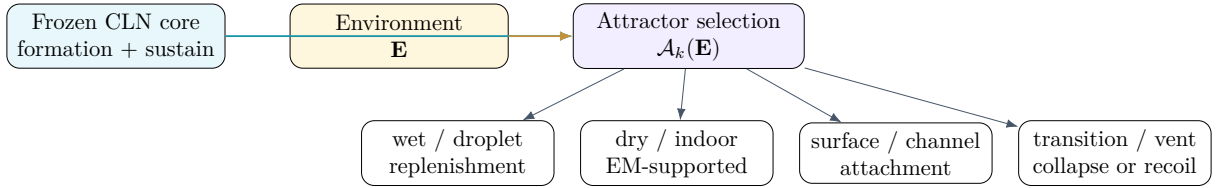


Figure 1. Multi-environment attractor architecture. This is a synthesis wrapper around the frozen CLN core, not a new force law.

3 Observational trigger: two bright anchors and a blue-to-orange transition

[UNVERIFIED MEDIA] The user-supplied plasma-vortex screenshots show two persistent bright loci near the upper rim of a blue/violet rotating luminous state, followed later by a strong yellow/orange takeover. These screenshots are online media and their apparatus description is not independently verified here; they are used only as visual motivation.



(a) Blue/violet-dominated state with two bright upper-rim loci.



(b) Later yellow/orange-dominated state.

Figure 2. User-supplied online screenshots. The visible colour change is real in the images; the microscopic meaning of the colours is not identified.

The colour itself must not be equated with temperature, coherence or composition. A safe observable is simply a measured emission state:

$$C(t) \in \{B, W, O, R, \dots\}, \quad (6)$$

where B is blue/violet-dominant, W white/saturated, O orange/yellow-dominant and R red-dominant. The hypothesis is that transitions such as $B \rightarrow O$ may mark a state change, but only spectroscopy can determine whether the change is thermal, compositional, chemical, electrical or optical-camera related.

External colour evidence that matters

Two independent publications make colour-state tracking scientifically reasonable without making colour diagnostic by itself:

- Kondo, Ofuruton and Ohtsuki (1997) reported that microwave-produced plasma luminous objects in a high-humidity atmosphere containing water droplets and vapour **grew and changed colour toward red** relative to the case without droplets/vapour [2].
- Cen, Yuan and Xue (2014) recorded a natural event for 1.64 s and reported the colour sequence **purple, orange, white and red** together with time-resolved spectroscopy [6].

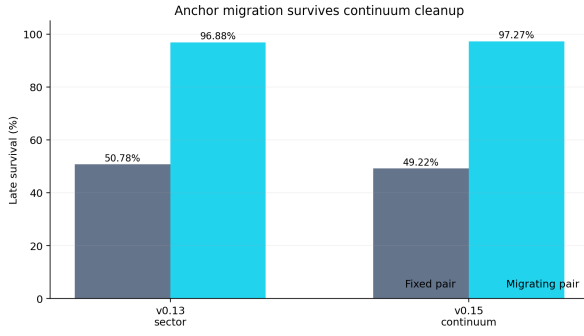
These results show that luminous-orb colour can evolve with state and environment; they do not identify the CLN blue/orange interpretation.



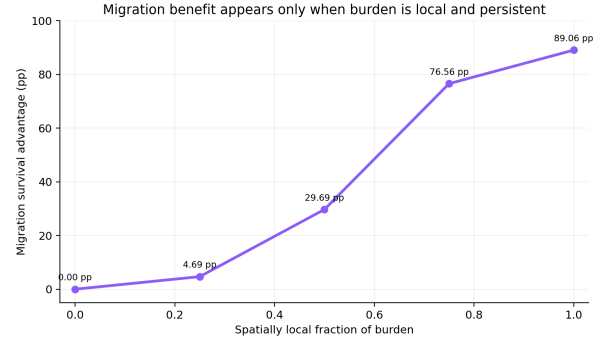
4.2 Break-test result

[MODEL] v0.14 exactly reconfirmed the v0.13 headline: fixed anchors gave 50.78% late survival, whereas continuous pair migration gave 96.88%. Collapse fell from 47.66% to 3.13%. The decisive identity null disconnected H from all CLN dynamics; fixed and moving structural histories then became exactly identical. Direct shape-stress by itself also failed to create the migration advantage.

The strongest causal mediation result was monotonic locality: when burden was global the migration advantage was zero; as the causal burden was made more local, migration became progressively more valuable.



(a) Survival before and after continuum cleanup.



(b) Continuum locality mediation curve.

Figure 4. The migration result survives both causal and numerical attacks.

4.3 Continuum boundary formulation

The v0.14 caveat was angular grid dependence. v0.15 replaced the coarse sector field with a periodic finite-volume representation on S^1 :

$$\frac{\partial H}{\partial t} = \lambda L(\theta, t) - R(H) + D_\theta \frac{\partial^2 H}{\partial \theta^2}, \quad \theta \in S^1. \quad (9)$$

No burden coefficient or failure threshold was retuned. The full 256-case result became 49.22% fixed versus 97.27% moving, with collapse 49.61% to 2.73% and median peak H 1.257 to 0.561. Independent finite-volume and Fourier/spectral solvers agreed at the 10^{-4} -level or better in the audited quantities, and periodic mean-balance residuals were at floating-point precision.

Frozen mathematical rule after v0.15

If a damaging boundary state is spatially local, repeatedly loading the same two physical sectors is fragile. Broad and persistent redistribution of both anchors, while preserving the two-anchor relationship, reduces local accumulation in this reduced-order system.

5 v0.16: removing the symbol H

The next attack removed the abstract H field entirely and replaced it with four independently written boundary-memory classes.

5.1 Thermal-memory surrogate

$$\frac{\partial T^*}{\partial t} = k_T L^2 - \frac{T^*}{\tau_T} + D_T \frac{\partial^2 T^*}{\partial \theta^2}, \quad (10)$$

$$\eta_T = \frac{1}{1 + (T^*/T_c)^p}. \quad (11)$$

5.2 Signed charge/attachment-memory surrogate

$$\frac{\partial q^*}{\partial t} = k_Q (s_1 L_1 - s_2 L_2) - \frac{q^*}{\tau_Q} + D_Q \frac{\partial^2 q^*}{\partial \theta^2}, \quad (12)$$

$$\eta_Q = \frac{1}{\sqrt{1 + (|q^*|/q_c)^2}}. \quad (13)$$

5.3 Saturating deposition/coverage surrogate

$$\frac{\partial c^*}{\partial t} = k_C L \left(1 - \frac{c^*}{c_{\max}}\right) - \frac{c^*}{\tau_C} + D_C \frac{\partial^2 c^*}{\partial \theta^2}, \quad (14)$$

$$\eta_C = \exp[-(c^*/c_c)^2]. \quad (15)$$

The electrothermal class coupled the thermal source to a signed-charge state and used $\eta_{ET} = \sqrt{\eta_T \eta_Q}$.

[MODEL] Across the full 256-case nominal tests, migration improved survival for all four classes. Across 384 independently sampled parameter sets, migration reduced peak local surrogate state in 384/384 and improved minimum CLN health in 384/384, with zero reverse failures in the central ensemble.

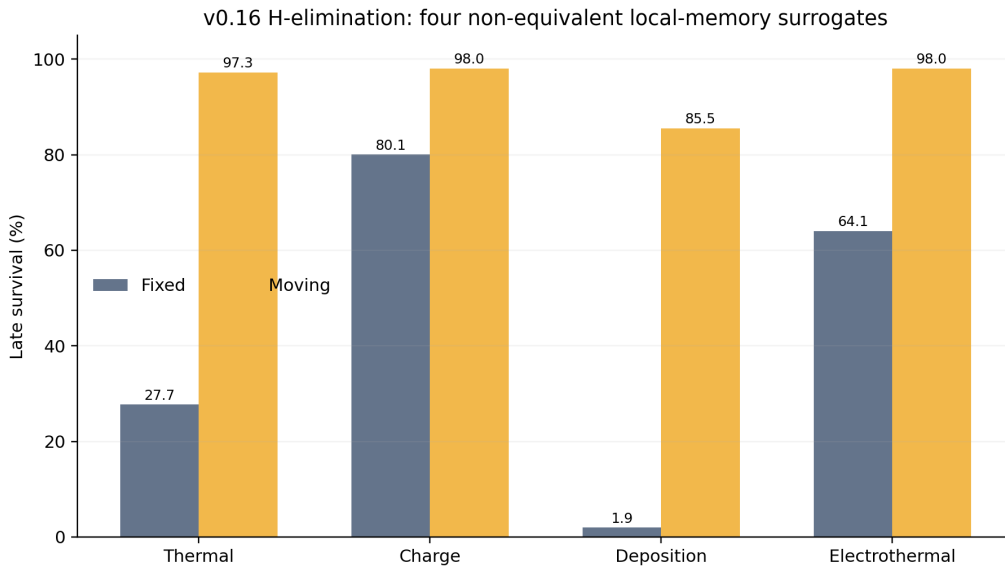


Figure 5. v0.16 H-elimination. The direction of the migration result is not specific to one burden equation.

The decisive nulls were stronger than the headline survival numbers. When the surrogate was disconnected from anchor effectiveness, fixed and moving structural histories were identical. When degradation was instantaneous with no memory, fixed and moving were identical. When the source

was spatially globalised, fixed and moving were again identical. Thus the surviving class is

$$\boxed{\text{spatially local} + \text{persistent in time.}} \quad (16)$$

6 v0.17: matched non-spatial rivals

A critic can fit the fixed-anchor failures with a global mechanism. v0.17 therefore calibrated four non-spatial rivals on fixed cases only before revealing the moving result: anchor-identity fatigue, elapsed-time decay, well-mixed cumulative-energy fatigue, and orientation-independent stochastic hazard.

[MODEL] Each rival matched the fixed failure rate closely, but because none possessed a boundary coordinate, each predicted exactly the same structural history for fixed and CONT-180 twins. Across all 16 target-surrogate $\times$ rival pairs, the maximum fixed/moving structural difference was exactly zero. A nonphysical oracle that copied every fixed case perfectly also failed to produce migration rescue when copied into the moving branch.

The held-out topology battery provides the stronger discriminator. The spatial model distinguishes broad pair rotation, small repeated oscillation, one-anchor movement, separation-only movement, random relocation, and motion that stops early. The non-spatial rivals predict no topology dependence at all.

v0.17 discriminator

Within the present reduced-order mathematics, the migration response depends on **where the pair has previously loaded the boundary**, not merely on elapsed time, total energy, anchor identity, or orientation-independent stochastic failure.

7 v0.18: fresh-medium replenishment as a serious critic rival

The moisture/replenishment hypothesis was intentionally introduced as an adversary to the spatial-memory interpretation. v0.18 used no angular memory. Instead it added a global fatigue state $F(t)$ and a global fresh-medium resource $R(t)$:

$$\frac{dR}{dt} = k_{\text{refresh}} \Gamma_{\text{fresh}} (1 - R) - \frac{R}{\tau_R}, \quad (17)$$

$$\frac{dF}{dt} = k_{\text{load}} L^2 - \frac{F}{\tau_F} (1 + k_{\text{relief}} R), \quad (18)$$

$$\eta = \frac{1}{1 + (F/F_c)^p}. \quad (19)$$

The model was calibrated only to a fixed and one CONT-180 development branch, frozen, and then evaluated on held-out cases.

[MODEL] On the held-out full 256 cases, the global-relief rival predicted 51.95% fixed and 96.88% CONT-180 - remarkably close to the earlier spatial headlines. Therefore environmental/global relief is a genuine rival for the *aggregate survival rescue*.

It did not, however, reproduce the full movement-topology fingerprint. Small or separation-only repeated oscillations were heavily over-rewarded because the global model measures motion/refresh but does not remember that the same boundary region is being revisited.

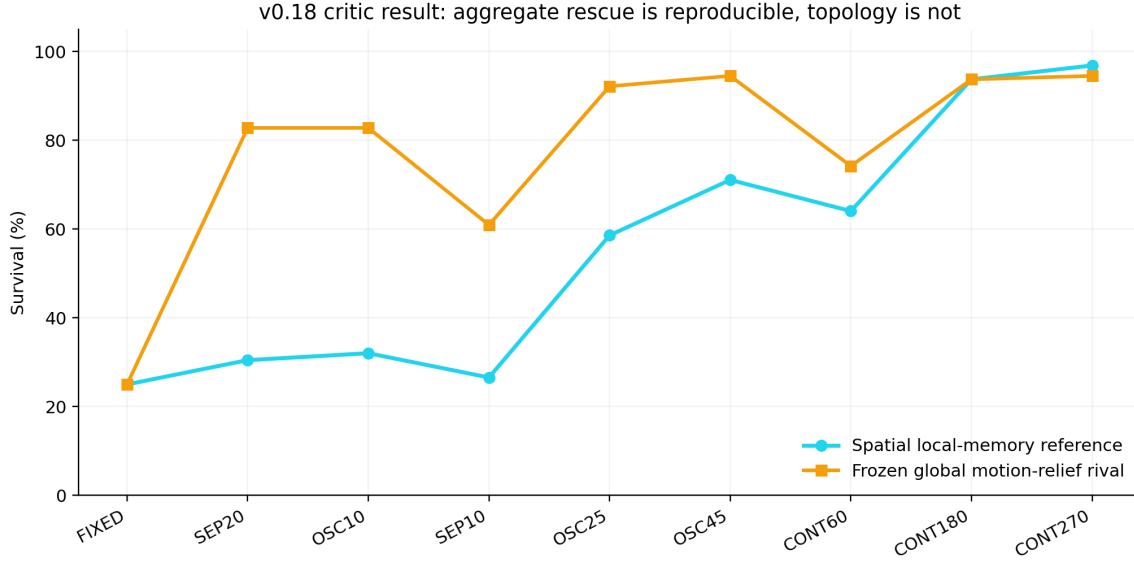


Figure 6. v0.18 critic result. A global motion/fresh-medium relief law can match the overall rescue yet miss the topology that distinguishes broad fresh-sector coverage from repeated local sweeping.

Environmental replenishment interpretation

A wet atmosphere can be treated as a replenished reaction reservoir rather than merely “humidity.” A generic encounter/capture rate is

$$\Gamma_d \sim n_d A_{\text{cap}} v_{\text{rel}}, \quad (20)$$

where n_d is droplet number density, A_{cap} an effective capture cross-section and v_{rel} relative motion. The present model does not identify the microphysics; possible conventional channels include heating/evaporation, charge exchange, plasma chemistry, attachment renewal and cooling.

Retrospective literature convergence: droplets and vapour

The 1997 Waseda/Tokyo group paper is particularly relevant because it predates this project by decades and independently studied microwave plasma luminescence in a high-humidity atmosphere containing water droplets and vapour. The authors reported that the luminous objects **grew and shifted red** compared with the no-droplet/no-vapour case [2]. This does not validate the CLN replenishment equation, but it establishes that moisture can materially alter laboratory fireball size/colour in the same experimental family.

8 v0.19: inter-anchor exhaust and ordinary recoil

The next hypothesis joined the fresh-medium reservoir to the repeatedly observed two-anchor geometry. The proposed kinematic chain is

$$\boxed{\text{fresh medium} \rightarrow \text{capture/process} \rightarrow \text{inter-anchor outflow} \rightarrow \text{opposite recoil.}} \quad (21)$$

Let $\hat{\mathbf{n}}_{12}$ point outward through the inter-anchor gap. If processed medium leaves with mass-flow

rate $\dot{m}_{\text{out}}$ and exhaust velocity $\mathbf{v}_{\text{out}} = v_{\text{out}}\hat{\mathbf{n}}_{12}$, ordinary momentum bookkeeping gives

$$\boxed{\mathbf{F}_{\text{recoil}} = -\dot{m}_{\text{out}}v_{\text{out}}\hat{\mathbf{n}}_{12}.} \quad (22)$$

No exotic propulsion term is needed for this kinematic hypothesis.

[MODEL] In the normalized v0.19 model, gap-directed exhaust produced nonzero wandering; isotropic outflow, no droplets, and no aperture produced zero net recoil/translation. Random exhaust could also wander, but lost alignment with the anchor gap. In the GAP-FIXED branch, exhaust preceded the declared launch in 100% of cases where both events occurred, with a median model delay of 553 model-ms.

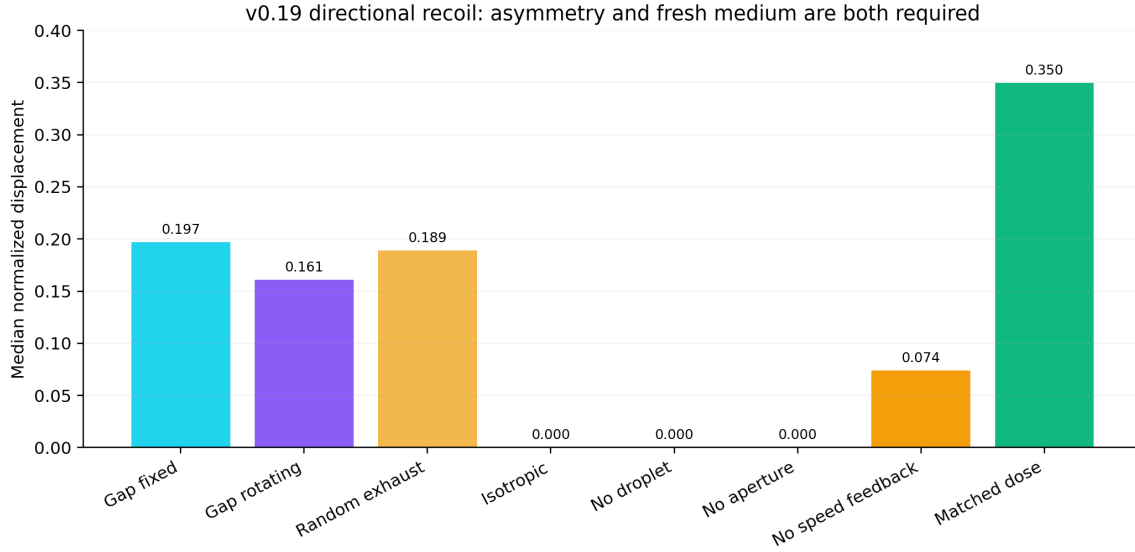


Figure 7. v0.19 normalized kinematic nulls. These are not physical displacements; they only test whether the proposed pathway is internally consistent.

The model also showed that motion-enhanced capture is an amplifier, not a unique requirement. A matched-dose constant fresh-medium supply could equal or exceed the displacement produced by speed-dependent capture. The deeper requirement is continual processable-medium supply plus directional asymmetry.

8.1 Decisive observational prediction

The current directional hypothesis is falsifiable without knowing the microphysics:

$$\hat{\mathbf{n}}_{\text{plume}}(t) \approx \hat{\mathbf{n}}_{12}(t), \quad (23)$$

$$t_{\text{plume}} < t_{\text{accel}}, \quad (24)$$

$$\mathbf{a}_{\text{orb}}(t) \cdot \hat{\mathbf{n}}_{\text{plume}}(t) < 0. \quad (25)$$

If the pair orientation rotates, the preferred recoil direction should rotate with it. Failure of those relationships directly weakens the inter-anchor exhaust hypothesis.

9 What the user-supplied outdoor frames do and do not show

[UNVERIFIED MEDIA] The supplied outdoor screenshots show a bright upper body connected to or accompanied by a narrow luminous lower neck/filament, with the relative body/neck geometry changing across frames. The images are heavily saturated and cannot by themselves resolve an inter-anchor top port, internal pressure, or audio onset.



Figure 8. Selected user-supplied frames from an online clip of uncertain provenance. They motivate a channel/outflow hypothesis but are not used as evidence of pressure, vapour composition or recoil.

The correct next observational test is therefore frame-resolved and audio-synchronised analysis of the original clip, with camera motion, wind, arc-root motion, saturation/bloom and possible ground-connected discharge treated as explicit rivals.

10 Microwave fireballs: the strongest conventional laboratory bridge

10.1 1991 Nature result

[LITERATURE] Ohtsuki and Ofuruton reported plasma fireballs in natural air produced by microwave interference. Their abstract states that the laboratory objects showed properties reminiscent of eyewitness ball-lightning reports, including motion against wind and passage through a wall intact [1]. The full paper reports a 3-mm ceramic board inserted between cavity and waveguide through which a plasma fireball moved intact without visible damage or melting.

This matters because it establishes that apparent “wall passage” of a luminous plasma fireball is not automatically outside conventional laboratory plasma/EM phenomenology.

10.2 1997 humidity experiment

[LITERATURE] Kondo, Ofuruton and Ohtsuki then studied plasma luminescence in a high-humidity atmosphere containing water droplets and vapour. Their published abstract reports larger luminous objects and a colour change toward red compared with the dry case [2]. The result is directly relevant to the project’s wet/dry attractor distinction and colour-state hypothesis, while still not identifying the natural phenomenon.

10.3 1998 unusual-motion and field-mode work

[LITERATURE] The same research group reported that microwave fireballs could stabilise on a metal wall and move along a central metal rod even though the original standing-wave picture

predicted weak field at those surfaces. Their nonlinear electromagnetic-wave model found high electric-field intensity around the fireball and was proposed to explain this unusual persistence/motion [5, 4].

This external work supports a broad architectural lesson already present in the CLN programme:

$$\boxed{\text{formation geometry need not be identical to the later sustaining/moving state.}} \quad (26)$$

10.4 Barrier passage as field-supported persistence or re-formation

A later microwave theory proposed that microwave transmission through dielectric material could explain the ceramic-plate result and reports of entry through glass, treating the luminous structure as a microwave/plasma cavity rather than a solid parcel of plasma tunnelling atom-by-atom through matter [7].

That interpretation remains a theory. Nevertheless, it provides a conventional alternative that should be tested before any more exotic “matter phasing” interpretation:

$$\boxed{\begin{array}{l} \text{state on side A} \rightarrow \text{field/energy coupling through dielectric} \\ \rightarrow \text{persistent or re-formed state on side B} \end{array}} \quad (27)$$

11 Blue, orange and microwave-supported states: a cautious state map

The current synthesis does *not* assert that Ohtsuki’s fireballs were the same “orange state” seen in the user-supplied ring screenshot. Their publications do not establish such a colour pathway. A useful hypothesis is instead that multiple formation routes can land in overlapping luminous attractors.

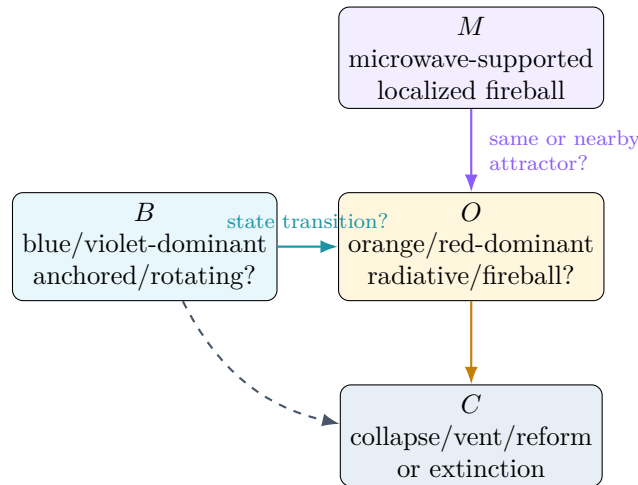


Figure 9. Hypothesis-only state map. Question marks are deliberate: colour is an observable, not yet a mechanism label.

A testable state transition should be defined by multiple simultaneous observables, not colour alone. Candidate transition markers include local anchor-state growth, opening probability, emission spectrum, shape/sphericity, rotation/shear, mass/particle flux and recovery behaviour.

12 Multi-environment attractor matrix

Environment	Candidate support	Expected behaviour	Primary falsifier
Wet / droplet-rich	Fresh-medium processing, charge/heat exchange, possible mass recoil	Survival rescue; colour shift; vent/recoil; motion into fresh medium	Fresh replacement provides no benefit and no directional mass exchange is measurable
Dry / indoor dielectric	EM cavity / field-supported excitation	Persistence without moisture; possible barrier reformation	State cannot persist when droplet support is removed under otherwise matched field conditions
Conductive surface / rod	Attachment/channel interaction	Surface stabilisation or guided motion	Motion is unrelated to surface field/current geometry
Discharge / low-pressure channel	Conventional plasma guiding	Luminous ball follows preconditioned channel	No relationship between channel and motion
Acoustic perturbation	Pressure/flow/resonant modulation of a marginal state	Small trajectory/state modulation only under sufficient forcing	No measurable response above airflow/electrical controls

The purpose of this matrix is not to add mechanisms until something fits. It is to predeclare *different environmental rivals* and require each to make different predictions.

13 A unified hypothesis without overclaiming

The strongest current synthesis is a hybrid, not a single mechanism:

boundary geometry $\rightarrow$ where local stress/attachment accumulates,
 anchor migration $\rightarrow$ redistributes local persistent loading,
 environment $\rightarrow$ supplies or removes support channels,
 fresh medium $\rightarrow$ can globally relieve or feed the state,
 aperture asymmetry $\rightarrow$ can create directed ordinary recoil,
 EM support $\rightarrow$ can sustain/re-form a luminous state across dielectrics.

(28)

This synthesis explains why several behaviours may coexist without requiring every observed orb to use moisture, every fireball to have identical anchors, or every wall-passage report to be literal transport of the same plasma particles through solid matter.

14 What is actually strengthened by the published literature

Project sis/result	hypothe-	Independent literature analogue	What can safely be said
Two-anchor/field- supported luminous state		Microwave interference fireballs in air [1]	Localised plasma fireballs can be produced by an external EM geometry; this does not identify the two-anchor mechanism.
Environment changes visible state		Water-droplet/vapour ex- periment [2]	Moisture can change size and colour of laboratory plasma luminous objects.
Formation field differs from later motion		Nonlinear EM motion study [5]	Laboratory fireballs can persist/move where a naive static standing-wave model predicts they should not.
Barrier passage / re- formation branch		Ceramic-board passage [1]; microwave theory [7]	Apparent wall passage has a laboratory analogue; dielectric field transmission is a conventional interpretation, not proof of the natural mechanism.
Colour-state evolution		Natural spectroscopy [6]	At least one natural event showed time-dependent colour and material emission; colour is not a unique mechanism identifier.
Channel-guided plasma-ball motion		Confined plasma balls along a discharge-created low-pressure channel [8]	Environment-guided luminous-ball motion exists in laboratory plasma physics.

15 Falsification programme

The hypothesis becomes useful only when it can fail. The following tests are deliberately stronger than another visual match.

15.1 F1 - anchor-gap/plume/recoil sequence

Required if the inter-anchor exhaust idea is correct:

$$\hat{\mathbf{n}}_{\text{plume}} \approx \hat{\mathbf{n}}_{12}, \quad t_{\text{plume}} < t_{\text{accel}}, \quad \mathbf{a} \cdot \hat{\mathbf{n}}_{\text{plume}} < 0. \quad (29)$$

A repeated failure of direction or timing rejects the specific recoil interpretation.

15.2 F2 - crossed anchor redistribution $\times$ fresh-medium replacement

A blinded 2×2 or 2×3 test separates spatial memory from environmental replenishment:

	No fresh replacement	Fresh replacement
Fixed anchors	A	B
Moving anchors	C	D

Spatial memory predicts $C > A$ even with fixed external medium. Environmental replenishment predicts $B > A$ even with fixed anchors. A genuine hybrid predicts both and may produce an interaction in D .

15.3 F3 - colour is not enough

A valid blue-to-orange state transition must correlate with an independent physical variable such as spectral composition, local field/current geometry, shape, flux, density proxy or recovery dynamics. If colour changes while all physical-state observables remain unchanged, the colour hypothesis is weakened.

15.4 F4 - barrier passage

For a field-supported re-formation model, barrier response should depend on material electromagnetic properties and geometry. A claim of literal matter tunnelling predicts a very different interaction signature. The first model is therefore the critic-safe default until data reject it.

15.5 F5 - online-video provenance

No video should be used as scientific evidence until the original uninterrupted file, metadata, source identity, camera motion and audio are available. Reposted Shorts can motivate a hypothesis but cannot validate it.

16 Recommended next work: observation first, then low-energy analogue

The next stage should not be another mechanism added to the equations. The highest-value work is:

1. **Original-video acquisition and frame audit.** Track the two luminous loci, gap axis, plume/channel axis, centroid, velocity, acceleration and audio onset frame by frame.
2. **Published-experiment map.** Reconstruct the Ohtsuki/Ofuruton/Kondo programme at the level of field topology, environmental variables, observed states, barrier materials and diagnostics - without translating published high-power apparatus into construction instructions.
3. **Multi-environment attractor sweep.** Keep the CLN core frozen and vary environment classes independently: wet/droplet, dry/indoor, conductive surface, dielectric barrier, channel/airflow, and acoustic perturbation.
4. **Safe analogue hierarchy.** Begin with low-energy diagnostics and non-hazardous surrogates that test topology, memory and measurement logic before any plasma or microwave hardware is considered.
5. **Spectroscopy as the colour gate.** Treat blue/orange/red as observables only; require spectral confirmation before assigning thermal or chemical meaning.

Safety and translation boundary

The present report is intentionally not a construction manual. Published microwave-fireball papers involved hazardous electromagnetic/plasma conditions. Any future physical programme must be developed through institutional electrical, RF/microwave, pressure, fire and plasma

safety review. This report supplies hypotheses, variables, nulls and observational tests only.

17 Current verdict

The CLN programme has progressed from “can a bounded luminous state exist in the normal form?” to a model-discrimination framework with specific competing mechanisms. The most defensible present conclusions are:

1. **[MODEL]** Persistent local boundary memory is a robust mathematical explanation of why broad two-anchor redistribution can rescue the modeled state; the effect survives continuum cleanup, elimination of H , four non-equivalent surrogate laws, and matched non-spatial rivals.
2. **[MODEL]** Fresh-medium/global relief is a serious rival for the aggregate survival rescue, but it does not reproduce the full movement-topology fingerprint.
3. **[MODEL]** Directional processed-medium outflow through an inter-anchor port is kinematically capable of producing opposite recoil under ordinary momentum conservation; the decisive test is directional timing in real data.
4. **[LITERATURE]** Independent microwave-plasma experiments already demonstrate laboratory fireballs in air, unusual motion/stabilisation, moisture-dependent growth/colour change, and ceramic-barrier passage.
5. **[LITERATURE]** A natural spectroscopic event demonstrates that ball-lightning colour and intensity can evolve substantially during a single lifetime and that environmental material can be present in the emission spectrum.
6. **[HYPOTHESIS]** The most useful synthesis is therefore a **multi-environment attractor family**, not a universal one-mechanism explanation.

Frozen hypothesis statement

A coherent luminous node may be a bounded plasma/field attractor whose visible state is set jointly by formation geometry, local boundary-memory processes and environmental support. Broad redistribution of a successful two-anchor geometry can reduce persistent local loading; replenished external medium can independently support or modify the state; and asymmetric processed-medium release can provide ordinary reaction recoil. Microwave-supported fireballs provide an independent conventional laboratory analogue for dry/indoor persistence and dielectric-barrier passage. None of these mechanisms is yet identified as the explanation of natural ball lightning.

Appendix A - Reproducibility ladder and package hashes

Stage	Verdict / purpose	Package SHA-256
v0.14	Anchor-burden adversarial break test; survives with grid caveat	731571ffbe03868c3b425a520f9060c67081ecf1a664f675337f9d87536b7c2d
v0.15	Periodic continuum/finite-volume hardening; grid caveat closed	e4f14433d16a8e90309bd4f7aab9314b2e2206f614a1d09e2ba790d48edec319
v0.16	H-elimination via four physical-style boundary surrogates	560f6627b3ff5041d25ec61a7698e1ea4ff6b769f3797aaf99e20b29fc9e843b
v0.17	Matched non-spatial rival discrimination	f16a12cf52bc6eaa7b980f14c66fb908d12213274a257da955a837a42a1436d1
v0.18	Fresh-medium/global-relief and recoil rival	8d029d0494cf27b79015c0d8b8a7ed09c0021601f4f07d44ffe136bbffcf7931
v0.19	Droplet-track/inter-anchor directional recoil discriminator	6da4bce8b3109e8accec0859be8b3f4923ba6680aef20408d70b840f211cd3ad0

Earlier v0.2-v0.12 packages establish the frozen CLN formation, sustainer, stress-tested feedback, steering/bandwidth and boundary-topology handoff layers. This synthesis focuses on the later adversarial mechanism-discrimination chain because it is the part most relevant to the present hypothesis.

Appendix B - Symbol dictionary

Symbol	Meaning in this report
$\mathcal{N}_{\text{CLN}}$	Dimensionless candidate-node diagnostic $R_\phi L_\Omega S_T$; not a force.
$H(\theta, t)$	Legacy normalized local boundary-burden coordinate used in v0.13-v0.15.
$L(\theta, t)$	Normalized anchor/boundary loading distribution.
D_θ	Angular diffusion coefficient in the normalized continuum boundary model.
$\theta_{1,2}$	Two anchor/contact angles.
ψ_{anchor}	Midpoint/orientation of the anchor pair.
$\Delta\theta_{\text{anchor}}$	Pair separation, preserved in the successful migration branch.
T^*, q^*, c^*	Normalized thermal, signed-charge and surface-coverage surrogate fields.
η	Generic anchor-effectiveness factor in surrogate/rival models.
$R(t)$	Normalized fresh-medium resource in v0.18.
$F(t)$	Global fatigue state in the v0.18 non-spatial rival.
$\Gamma_{\text{fresh}}, \Gamma_d$	Normalized fresh-medium/droplet encounter or replacement flux.
A_{12}	Inter-anchor aperture/opening coordinate.
$\hat{\mathbf{n}}_{12}$	Outward axis through the inter-anchor gap.
$\dot{m}_{\text{out}}$	Physical mass-flow notation used only in the generic momentum equation; not measured in v0.19.

$\mathbf{F}_{\text{recoil}}$	Ordinary reaction force from directional mass outflow; not an RBFL gravity term.
$C(t)$	Observable colour/emission-state label; not a temperature or coherence variable by definition.
$\mathbf{E}$	Environment vector controlling the attractor family.
$\mathcal{A}_k$	A bounded state/attractor selected by the core dynamics under a given environment.

Appendix C - External literature

References

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Appendix D - Media provenance note

The screenshots reproduced in this report were supplied by the project owner from online video platforms. Their authenticity, date, original camera file, continuity and metadata have not been independently verified. They are included because they motivated falsifiable model questions. They are **not** counted as scientific evidence in the report’s claim ladder. The exact indoor YouTube Short discussed during development was presented online as an alleged indoor ball-lightning clip; its authenticity remains unresolved.

End of report.

Show the ladder, not just the top step.