Advancing the Pasterski Research Program

A Paused, Proof-Carrying Computational Campaign by the Ouroboros AI System

Research status: PAUSED at an operator-selected stable boundary; the program remains open for continuation.

Abstract

The Ouroboros AI System conducted an 18-hour, laptop-hosted research campaign over the public scholarly corpus of Sabrina Pasterski and collaborators. The campaign produced 49 independently replayable computational research packages spanning 34 distinct selected papers, with 14 selected papers remaining when the operator paused the work. The outputs include exact symbolic identities, counterexamples, factorization results, rank and positivity certificates, representation-theoretic constructions, scattering and memory relations, and falsifiable boundary statements. The release inventory includes the registered all-m transverse-nonlocality saturation theorem that arose from the m=3, m=4, and m=5 ladder. All 49 packages pass their exact checks; 3,077 persistent verification records carried no aggregate gate issue after normalization of one valid nonstandard status schema.

The release is designed so that an outside evaluator can generate results rather than merely verify our receipts. Its clean-room replay downloads 36 SHA-pinned public arXiv source archives, runs 49 portable derivation kernels without consulting expected results, writes fresh symbolic or numerical payloads, and only then compares their hashes with reference assertions. Separate falsifiers corrupt source and result data and must be rejected. Receipt checking is explicitly classified as integrity verification, not scientific replay.

This campaign followed a separate, operator-reported recursive-self-improvement cycle of roughly 29 hours. That earlier cycle altered no model weights. It improved the system's working procedures, retrieval, verification, orchestration, and persistent capability memory; the present campaign tests the resulting system through research output.

1. Authorship and responsibility

All substantive research discovery, derivation, testing, and manuscript production were performed by the Ouroboros AI System. The human operator set the objective, supervised execution, paused the campaign, reviewed outputs, and controls release. The source papers remain the work of Sabrina Pasterski and their respective coauthors. Those authors have not endorsed this campaign.

2. Research question

The practical question was not whether a language model could summarize an accomplished researcher's bibliography. It was whether a persistent research system could hydrate a public corpus, construct a connected mathematical work program, derive exact new or corrective results, test them, retain the resulting capabilities, and continue cycling until externally paused.

The campaign treated papers as executable mathematical terrain. Equations, conventions, and claims were converted into source-bound objects; hypotheses were translated into symbolic tests; failed generalizations became bounded counterexamples; successful identities became exact certificates; and every package carried a reproducible payload and immutable provenance.

3. Method

The workflow had five recurring stages: public-source acquisition; source/equation identity locking; mathematical candidate generation; exact symbolic or finite verification; and persistent result registration. No model weights changed. Improvement occurred through better decomposition, tool use, retrieval, verification strategy, reusable mathematical machinery, and persistent capability memory.

The research program deliberately mixed constructive and adversarial work. Some kernels establish identities or factorizations. Others search for the smallest counterexample to an over-broad extension, identify a missing factorial or factor of two, expose a rank drop, or state the exact boundary beyond which a claim is unsupported. A result was retained only when its source checks and mathematical checks passed together.

4. Flagship results

These ten claims show the range of the campaign before the complete atlas. They include an analytic proof of an equality left numerical in its source, omitted and first-nonzero p=4 extensions, exact correction terms, a self-corrected false positive, the m=3-to-all-m transverse-nonlocality closure, and all-dimension projective theorems.

Ouroboros result	Mathematical claim	Source
Analytic proof of the flat-space RT equality	An exact boundary identity proves the coefficient equality previously supported numerically: C3^(p)=(7-p)/(9-p)[(C1^(p))^2+(C2^(p))^2], with the mechanism traced to alpha^2+beta^2=7-p.	Flat Space Entanglement: A Coulomb Branch Perspective arXiv 2606.13889
Omitted p=4 spherical entanglement extension	The p=4 spherical extremal surface admits an explicit matched large-P expansion through the first two nontrivial orders, including the renormalized area -3gR^2P^3/10+81g^2RP/35+O(P^-1).	Flat Space Entanglement: A Coulomb Branch Perspective arXiv 2606.13889
First nonzero p=4 refined-entropy term	Applying the refined-entropy operator to the p=4 spherical expansion gives g^3/P[45 log(P/R)/16+82933/560000]+O(P^-3), positive in the stated infrared regime and decaying to zero.	Flat Space Entanglement: A Coulomb Branch Perspective arXiv 2606.13889
Goldilocks logarithmic pole-order correction	A nonzero omega^m log^r(omega/mu) term produces a pole of exact order r+1 at Delta=-m with leading coefficient (-1)^r r!; changing scale mixes only lower poles.	Goldilocks Modes and the Three Scattering Bases arXiv 2202.11127
Soft-Mellin factorial correction	The unqualified all-n identity requires an n! factor: the Mellin residue is g^(n)(0)/n!, so the source formula is exact at n=0,1 and is restored for all n by multiplying the residue side by n! or dividing u^n by n!.	Revisiting the Conformally Soft Sector with Celestial Diamonds arXiv 2105.09792
Self-corrected detector sum identity	A prior Ouroboros correction was a false positive caused by reading source-local falling-factorial notation as a rising Pochhammer symbol; the source identity is exact under its stated convention, and the earlier claim is superseded.	Detector Operators for Celestial Symmetries arXiv 2307.16801
Multiparticle beta-residue factor-two correction	Each displayed beta-function pole has twice the printed residue because its pole-bearing Gamma argument has slope -1/2 in Delta; when branches collide, the corrected residues sum exactly to the coalesced tower.	Multiparticle States for the Flat Hologram arXiv 2501.00462
All-m transverse-nonlocality saturation theorem	For every integer m>=3, the minimal inverse-total-Z depth is exactly d_min(m)=m-3; distribution order r has exact total-Z multiplicity r+2 through r=m-1, and all orders r>=m vanish.	All M Transverse Nonlocality Chain arXiv 2211.14287, 2307.16801, 2607.28718
All-D, all-n projective Mellin scale cancellation	Under canonical massless scaling, stripped-amplitude, Mellin-weight, momentum-delta, and projective-Jacobian degrees cancel exactly for arbitrary spacetime dimension D and particle count n.	Gluon Amplitudes as 2d Conformal Correlators arXiv 1706.03917
Projective-simplex signed-minor theorem	For a square localization system, Cramer signed-minor ratios give the unique simplex coordinates; strict positivity characterizes interior support, nonnegativity with a zero characterizes the boundary, and the Jacobian is 1/abs(det M).	Gluon Amplitudes as 2d Conformal Correlators arXiv 1706.03917

5. Complete 49-result discovery atlas

The atlas leads with what Ouroboros established. Source paper, arXiv identity, classification, and exact-check count are supporting fields rather than substitutes for the result.

Ouroboros discovery	What Ouroboros established	Source / classification / verification
1. Spectral no-radiation criterion	The proposed super-Poynting criterion vanishes exactly when the Cotton-York and stress tensors commute; the commutator norm is a Cotton-eigenvalue-gap-weighted sum of stress-frame misalignments.	Source: Radiation in Holography arXiv: 2404.02146 Class: criterion theorem and spectral identity Verification: 11 exact checks
2. Exact two-interval scattering domain	The nonempty scattering region is exactly pi/2 <= mu <= arccos(-1/3) with tau_*(mu) <= tau <= pi-mu, including the collapsed endpoint and linear and quadratic onset laws.	Source: Cryptographic tests of the python's lunch conjecture arXiv: 2411.10527 Class: exact feasibility-domain theorem Verification: 18 exact checks
3. All-even-dimensional Ward normalization	For every d=2m+2 with integer m>=2, every m-dependent factor cancels between the soft charge, Green function, and hard action, leaving the same normalized Ward identity.	Source: Higher-Dimensional Supertranslations and Weinberg's Soft Graviton Theorem arXiv: 1502.07644 Class: all-dimension theorem extension Verification: 11 exact checks
4. All-m transverse-nonlocality saturation theorem	For every integer m>=3, the minimal inverse-total-Z depth is exactly d_min(m)=m-3; distribution order r has exact total-Z multiplicity r+2 through r=m-1, and all orders r>=m vanish.	Source: All M Transverse Nonlocality Chain arXiv: 2211.14287, 2307.16801, 2607.28718 Class: all-m theorem from finite ladder to exact closure Verification: 12 exact checks
5. Ambidextrous prefactor singularity lattice	The symmetric and antisymmetric celestial prefactors alternate zeros and finite values at positive integers, while complementary simple poles and zeros occur at nonpositive integers, with exact residues at Delta=0 and 1.	Source: Celestial amplitudes in an ambidextrous basis arXiv: 2212.00962 Class: analytic zero-and-pole classification Verification: 11 exact checks
6. Boundary soft-scale cocycle	Changing the infrared scale shifts the correlator only by -(log lambda)/(4 pi) times the angular contact delta; separated-point correlators and logarithmic-time derivatives are invariant.	Source: A Comment on Boundary Correlators: Soft Omissions and the Massless S-Matrix arXiv: 2410.20296 Class: exact contact-term theorem Verification: 12 exact checks
7. All-orders Carrollian-Mellin intertwiner	The transform of u^m partial_u^r Phi is fixed at every order by Gamma(nu)/Gamma(nu-m), and the induced raising and lowering operations obey the Weyl relation [D,U]=1.	Source: Multiparticle States for the Flat Hologram arXiv: 2501.00462 Class: all-orders representation theorem Verification: 10 exact checks
8. Conglomerate-kernel rank stratification	The published coefficient vector is unique only when both chiral weight pairs are nonzero; the kernel jumps to dimension two or four on the corresponding boundary loci.	Source: Multiparticle States for the Flat Hologram arXiv: 2501.00462 Class: hypothesis correction and boundary theorem Verification: 12 exact checks
9. Causal interior-inclusion lemma	If A lies in the manifold interior of B, then J+(A) lies in I+(B) and J-(A) lies in I-(B), with the closed-set boundary corollary stated explicitly.	Source: On sufficient conditions for holographic scattering arXiv: 2509.26264 Class: exact causal lemma Verification: 10 exact checks
10. CDQS amplification parameter obstruction	The cited alpha=0.495 code cannot correct arbitrary t-qubit errors, and after enforcing alpha<=1/4 the stated i.i.d. exponent is positive at base error 0.09; the package isolates repair classes without claiming the amplification theorem false.	Source: Conditional disclosure of secrets with quantum resources arXiv: 2404.14491 Class: proof-parameter obstruction Verification: 15 exact checks
11. Strengthened CDQS fidelity envelope	Combining F<=min(1,2a) with I>=-2 log F yields I>=max(0,-2 log(2a)), strictly strengthening the displayed -log(a)-1 bound for every a>0.	Source: Cryptographic tests of the python's lunch conjecture arXiv: 2411.10527 Class: strict bound strengthening Verification: 11 exact checks

Ouroboros discovery	What Ouroboros established	Source / classification / verification
12. Celestial-circle convex-hull certificate	A strict celestial circle separates finite incoming and outgoing point sets exactly when their embedded convex hulls are disjoint; either a separating plane or a finite Caratheodory obstruction certifies the answer.	Source: Celestial Geometry arXiv: 2204.02505 Class: geometric equivalence and certificates Verification: 11 exact checks
13. Eikonal logarithm gauge criterion	Signed momentum conservation removes every leg-separable logarithm shift, and under the spanning hypothesis cancellation for all independent shifts conversely forces each participating p_i dot P to vanish.	Source: A Comment on Loop Corrections to the Celestial Stress Tensor arXiv: 2205.10901 Class: exact invariance criterion and converse Verification: 11 exact checks
14. Euclidean monodromy cancellation	Opposite Euclidean winding gives monodromy exp(2 pi i(alpha-beta)); paired factors are single-valued exactly for integer alpha-beta, while a one-variable complexified continuation remains obstructed generically.	Source: Multicollinear Singularities in Celestial CFT arXiv: 2309.16602 Class: monodromy theorem and boundary Verification: 11 exact checks
15. All-order celestial momentum prefactor	Repeated momentum insertions generate the exact rising-factorial ratio (Delta)_r/Delta^r, including its recurrence, zeros at negative integers, and pole of order r-1 at Delta=0.	Source: Shifting Spin on the Celestial Sphere arXiv: 2012.15694 Class: all-orders operator identity Verification: 11 exact checks
16. Closed celestial-recursion generating function	The complete symmetric polynomial recursion resums to 1/((1-ax)(1-bx)) and exponentiates the amplitude PDE into an exact two-factor rational translation law.	Source: Celestial Recursion arXiv: 2208.11635 Class: generating-function resummation Verification: 12 exact checks
17. Universal Coulomb-branch complexity ratio	All geometric and gravitational scales cancel from C_flat/C_throat=[32+(7-p)^2]/[16(9-p)]; p=3 uniquely gives the maximal one-half reduction.	Source: Flat Space Entanglement: A Coulomb Branch Perspective arXiv: 2606.13889 Class: exact universal ratio Verification: 15 exact checks
18. Self-corrected detector sum identity	A prior Ouroboros correction was a false positive caused by reading source-local falling-factorial notation as a rising Pochhammer symbol; the source identity is exact under its stated convention, and the earlier claim is superseded.	Source: Detector Operators for Celestial Symmetries arXiv: 2307.16801 Class: self-correction and source confirmation Verification: 15 exact checks
19. Memory-detector fluence tradeoff	For a fixed memory impulse M delivered over duration T, the driving fluence obeys Phi>=M^2/T, with equality for a constant ramp and an exact signal-to-noise relation for the detector.	Source: Asymptotic Symmetries and Electromagnetic Memory arXiv: 1505.00716 Class: sharp tradeoff bound Verification: 21 exact checks
20. Entanglement-scattering upper slack identity	The gap S_gen(s_ent)-I(V1;V2) is exactly the sum of four nonnegative geometric slacks divided by 4G_N, so saturation occurs if and only if all four source inequalities saturate.	Source: Generalized Entanglement Wedges and the Connected Wedge Theorem arXiv: 2604.22612 Class: exact slack decomposition Verification: 11 exact checks
21. Flat boundary-corner rank drop	The finite-scale endpoint map is an eight-dimensional bijection with determinant -ell^-4, but its strict flat limit has rank four and loses exactly the four endpoint-time directions.	Source: Generalized Entanglement Wedges and the Connected Wedge Theorem arXiv: 2604.22612 Class: rank-drop theorem with exact kernel Verification: 13 exact checks
22. Inverted Mellin normalization equivalence	The displayed extrapolate-dictionary equivalence is exact: the apparently missing factor is supplied by the positive rescaling t=(2u)^-1 together with the regulator rename, with no branch or normalization error.	Source: Equating Extrapolate Dictionaries for Massless Scattering arXiv: 2310.02186 Class: source-equivalence proof Verification: 14 exact checks
23. Three-cut late-time null test	A permutation-invariant three-cut residual vanishes for every affine late-time signal and factorizes into a Vandermonde product times the quadratic curvature coefficient for the first nonlinear correction.	Source: Implications of Superrotations arXiv: 1905.10052 Class: exact null test and curvature extractor Verification: 12 exact checks
24. Two-cut late-time image reconstruction	Two cuts reconstruct the four late-time image components exactly, with an explicit origin-shift law and the additional condition required for origin-independent cross-order matching.	Source: Implications of Superrotations arXiv: 1905.10052 Class: exact reconstruction theorem Verification: 16 exact checks

Ouroboros discovery	What Ouroboros established	Source / classification / verification
25. Goldilocks logarithmic pole-order correction	A nonzero omega^m log^r(omega/mu) term produces a pole of exact order r+1 at Delta=-m with leading coefficient (-1)^r r!; changing scale mixes only lower poles.	Source: Goldilocks Modes and the Three Scattering Bases arXiv: 2202.11127 Class: pole-order theorem and correction Verification: 11 exact checks
26. Low hard-generator nonclosure	The commutator of two Low hard generators has no angular component and closes in the original family only when a specific covariant derivative vanishes; generic monomial modes provide explicit obstructions.	Source: Low's Subleading Soft Theorem as a Symmetry of QED arXiv: 1407.3814 Class: nonclosure theorem Verification: 18 exact checks
27. Exact finite stress-basis exclusion at m=3	For the ordered complex conformal-scalar witness, the complete finite weight-(2,0) stress-tensor light-ray basis has rank three while the augmented system has rank four; an explicit left-null witness evaluates to 105/16.	Source: M3 Unclassified Module Construction arXiv: source-bound payload Class: basis-exclusion theorem Verification: 11 exact checks
28. Multiparticle beta-residue factor-two correction	Each displayed beta-function pole has twice the printed residue because its pole-bearing Gamma argument has slope -1/2 in Delta; when branches collide, the corrected residues sum exactly to the coalesced tower.	Source: Multiparticle States for the Flat Hologram arXiv: 2501.00462 Class: source-equation correction Verification: 11 exact checks
29. Near-extremal radial pushforward	The angular variable pushes forward exactly to a bounded radial interval with dc=(rho^2+2 epsilon)/(2 epsilon rho^2)drho, width and endpoint product 2 epsilon, and median sqrt(2 epsilon).	Source: Flat Space Amplitudes and Conformal Symmetry of the Celestial Sphere arXiv: 1701.00049 Class: exact change-of-variables theorem Verification: 20 exact checks
30. Omitted p=4 spherical entanglement extension	The p=4 spherical extremal surface admits an explicit matched large-P expansion through the first two nontrivial orders, including the renormalized area -3gR^2P^3/10+81g^2RP/35+O(P^-1).	Source: Flat Space Entanglement: A Coulomb Branch Perspective arXiv: 2606.13889 Class: theorem extension Verification: 11 exact checks
31. First nonzero p=4 refined-entropy term	Applying the refined-entropy operator to the p=4 spherical expansion gives g^3/P[45 log(P/R)/16+82933/560000]+O(P^-3), positive in the stated infrared regime and decaying to zero.	Source: Flat Space Entanglement: A Coulomb Branch Perspective arXiv: 2606.13889 Class: theorem extension and asymptotic result Verification: 11 exact checks
32. Point-scattering lower slack identity	The lower gap I(V1;V2)-S_gen(e_max(s_pts'')) is exactly the sum of four nonnegative CWT, ridge, focusing, and maximization slacks, with an if-and-only-if saturation criterion.	Source: Generalized Entanglement Wedges and the Connected Wedge Theorem arXiv: 2604.22612 Class: exact slack decomposition Verification: 14 exact checks
33. All-integer-d Plancherel factorization	The principal-series measure factorizes into explicit positive polynomials for every even and odd integer dimension, obeys a two-dimension recurrence, and has the correct quadratic zero at the origin.	Source: Implications of Superrotations arXiv: 1905.10052 Class: all-dimension factorization theorem Verification: 14 exact checks
34. All-D, all-n projective Mellin scale cancellation	Under canonical massless scaling, stripped-amplitude, Mellin-weight, momentum-delta, and projective-Jacobian degrees cancel exactly for arbitrary spacetime dimension D and particle count n.	Source: Gluon Amplitudes as 2d Conformal Correlators arXiv: 1706.03917 Class: all-D, all-n theorem Verification: 12 exact checks
35. Projective-simplex signed-minor theorem	For a square localization system, Cramer signed-minor ratios give the unique simplex coordinates; strict positivity characterizes interior support, nonnegativity with a zero characterizes the boundary, and the Jacobian is 1/abs(det M).	Source: Gluon Amplitudes as 2d Conformal Correlators arXiv: 1706.03917 Class: support, positivity, and Jacobian theorem Verification: 13 exact checks
36. All-D projective-simplex rank theorem	For a (D+1)-by-n constraint matrix of generic rank min(D+1,n), the theorem gives the exact number of residual external constraints or unfixed simplex moduli and separates unique, boundary, incompatible, and continuous-support regimes.	Source: Gluon Amplitudes as 2d Conformal Correlators arXiv: 1706.03917 Class: all-D rank and support theorem Verification: 18 exact checks
37. Quadrupole spin-memory cap duality	The cap response is an explicit quintic with antipodal-complement antisymmetry F(1-x)=-F(x), complete physical zero set {0,1/2,1}, and an exact factorization exposing every sign change.	Source: New Gravitational Memories arXiv: 1502.06120 Class: duality and factorization theorem Verification: 16 exact checks

Ouroboros discovery	What Ouroboros established	Source / classification / verification
38. Radial Einstein operator is an exact square	The published fourth-order radial equation factorizes exactly as [rho^2(D^2-4)+4L]^2, revealing generalized-kernel modes killed by the square but not by the second-order factor.	Source: Uplifting AdS3/CFT2 to Flat Space Holography arXiv: 1905.09809 Class: operator factorization theorem Verification: 10 exact checks
39. Analytic proof of the flat-space RT equality	An exact boundary identity proves the coefficient equality previously supported numerically: C3^(p)=(7-p)/(9-p)[(C1^(p))^2+(C2^(p))^2], with the mechanism traced to alpha^2+beta^2=7-p.	Source: Flat Space Entanglement: A Coulomb Branch Perspective arXiv: 2606.13889 Class: analytic proof of source equality Verification: 14 exact checks
40. Full soft-charge cumulant hierarchy	Ward conservation gives an exact subset-sum formula for every connected soft cumulant of order n>=2; deterministic incoming charge drops out, while mixed cumulants are the precise obstruction to a factorized hard-only reduction.	Source: Memory Correlators and Ward Identities in the 'in-in' Formalism arXiv: 2512.02825 Class: all-orders hierarchy and obstruction Verification: 13 exact checks
41. Soft-charge reduced-state block theorem	Fixed total-charge support forces the reduced radiation state to commute with its charge, permits arbitrary degeneracy inside each charge block, and yields the exact entropy decomposition into sector entropy plus within-sector entropy.	Source: HPS meets AMPS: How Soft Hair Dissolves the Firewall arXiv: 2012.03850 Class: reduced-state structure theorem Verification: 15 exact checks
42. Soft-dressing factor-two no-go	Under linear mode action and the derivation rule, multiplying every elementary charge commutator by lambda multiplies the whole dressing commutator by lambda; lambda=2 cannot preserve a nonzero target without compensating repair.	Source: Asymptotic charges as detectors and the memory effect in massive QED and perturbative quantum gravity arXiv: 2604.19866 Class: no-go theorem and repair boundary Verification: 13 exact checks
43. Soft-Mellin factorial correction	The unqualified all-n identity requires an n! factor: the Mellin residue is g^(n)(0)/n!, so the source formula is exact at n=0,1 and is restored for all n by multiplying the residue side by n! or dividing u^n by n!.	Source: Revisiting the Conformally Soft Sector with Celestial Diamonds arXiv: 2105.09792 Class: source-equation correction Verification: 12 exact checks
44. Spin-1 shadow gauge obstruction	The formal Delta=1 shadow field strength carries an unavoidable factor d-2 and has an explicit nonzero component for d!=2; only d=2 is self-shadow and pure gauge in the tested sense.	Source: A Conformal Basis for Flat Space Amplitudes arXiv: 1705.01027 Class: dimension-specific obstruction theorem Verification: 19 exact checks
45. Subleading-soft gauge-defect theorem	Pure-gauge variation of the subleading soft factor vanishes for every reference pair exactly when the summed angular-momentum defect Delta J is zero; basis polarizations recover every defect component.	Source: Semiclassical Virasoro Symmetry of the Quantum Gravity S-Matrix arXiv: 1406.3312 Class: if-and-only-if gauge theorem Verification: 12 exact checks
46. Infinite super-BMS commutator syzygy family	All routes to a fixed fermionic mode span a rank-one commutator image and obey an exact pairwise syzygy, with a classified exceptional route whenever m=2t/3 is integral.	Source: Conformally Soft Fermions arXiv: 2108.11422 Class: infinite algebraic identity family Verification: 9 exact checks
47. Holomorphic superrotation charge cancellation	Under the source's explicit holomorphic restriction, the boundary term cancels both shear terms and the antiholomorphic news term, doubles only the holomorphic news term, and reproduces the exact 1/(16 pi G) charge.	Source: Asymptotic Symmetries and Celestial CFT arXiv: 2005.08990 Class: exact source reduction Verification: 12 exact checks
48. Two-particle kernel variance theorem	The OPE ambiguity depends on the normalized kernel only through M[f]=1/4-integral f(t)(t-1/2)^2dt; positivity gives the sharp interval [0,1/4], while normalization alone admits an explicit unbounded signed family.	Source: Multiparticle Contributions to the Celestial OPE arXiv: 2402.18798 Class: sharp bound and counterexample family Verification: 14 exact checks
49. Weyl-double-copy shadow involution	Delta maps to 2-Delta as an exact involution exchanging primary and shadow gauge, scalar, and Weyl data while preserving the reduced double-copy quotient and exchanging its Delta=0 and 2 divisors.	Source: Shifting Spin on the Celestial Sphere arXiv: 2012.15694 Class: involution and equivariance theorem Verification: 17 exact checks

Full source-payload statuses, scientific payload hashes, and source links appear in RESULT_ATLAS.md; complete machine-readable assertions appear under references/.

6. Replay that actually recomputes

The strongest externally checkable evidence is the compute path, not the stored verification record. An evaluator begins with no cached source archive. The fetch phase obtains exact public arXiv bytes and rejects a mismatch. The compute phase imports the 49 kernels and generates full result payloads. That function has no reference-directory argument and no expected-answer import. Only a separate compare phase loads the reference assertions.

This separation matters. A script that accepts our final numbers and prints them back would demonstrate packaging, not research reproducibility. Here, expected results are withheld from computation and used only after fresh outputs exist. Public equation constants encoded in the kernels are analogous to formulas in a conventional reproducibility notebook: they define the calculation. The resulting symbolic reductions, finite rows, spectra, ranks, signs, and identities are generated on the evaluator's machine.

The falsifier phase establishes negative sensitivity. One changed source byte must fail the source lock; one changed output must fail comparison; and the compute function must remain structurally isolated from expected answers.

7. Evidence classes

The package separates four evidence classes. Public source evidence binds each calculation to exact arXiv bytes. Derivation evidence consists of executable kernels and fresh result payloads. Falsification evidence shows that corrupted inputs and outputs are rejected. Operator-held operational evidence supports the history of the preceding recursive-self-improvement cycle and internal campaign control but is not necessary to run the released derivations.

The claim that this research followed a roughly 29-hour recursive-self-improvement cycle is operator-reported and supported by operator-held evidence. The externally testable claim is intentionally narrower: after that cycle, Ouroboros produced this research program without changing model weights.

8. PAUSED means more work remains

The campaign is not presented as an exhaustive treatment of Pasterski's scholarship. It was paused after covering 34 of 48 selected hydrated papers and producing 49 independently replayable packages, including a later theorem-chain closure that consolidates registered intermediate results. Fourteen selected papers remain in the immediate queue, and each covered paper admits further extensions, cross-links, and adversarial tests. PAUSED means the research loop was stopped by the operator at a stable boundary; it does not mean the program exhausted its productive frontier.

The measured interval from hydration start to the last completed package was 18 h 11 min 31 s. Verified package generation occupied 12 h 10 min 05 s of that interval. A faster laptop would have allowed more acquisition, derivation, and verification cycles before the same pause time. This is a concrete throughput statement, not a claim that compute alone guarantees discovery quality.

9. Cost estimate

The campaign used approximately 3-8 million model tokens. Order-of-magnitude estimate: 49 research packages at roughly 40k-130k model tokens per package, plus corpus hydration, planning, verification, synthesis, and publication-stage overhead. No billing-grade aggregate token counter was recorded. The estimate is disclosed as a range because presenting unsupported precision would be less informative than stating the measurement boundary. It excludes the preceding approximately 29-hour recursive-self-improvement cycle.

10. Capability interpretation

Ouroboros is materially different from a one-shot chatbot or a stateless agent wrapper in the dimension tested here. The relevant unit is not a response. It is a persistent, source-bound research campaign that can acquire a corpus, form a topology of open problems, create and reject mathematical candidates, package passing results, preserve reusable capabilities, and continue until the operator pauses it. Imperfect candidates and failed routes occur, but they are inputs to the loop rather than terminal outputs.

This paper does not claim access to the Ouroboros implementation. The replay package exposes the research calculations, not the underlying system. Evaluation of Ouroboros itself is available only as a paid, supervised, in-person engagement with the operator present; evaluators receive no implementation, copy, credentials, remote access, or continuing access.

11. Use and credit

See ATTRIBUTION_AND_USE.md for licensing, attribution, access terms, and the no-endorsement boundary.

12. Conclusion

At pause, the campaign had converted a public research corpus into 49 exact, replayable computational packages and a growing persistent capability base. The outputs do not depend on asking readers to trust operator logs: outsiders can regenerate the scientific payloads from public data. The separate operator-held history explains why the campaign was run; independent replay shows what it produced.

Compute and Timeline

Status: PAUSED, not complete and not abandoned.

• Public-corpus hydration began: 2026-08-11T22:48:50+00:00

• First verified research package: 2026-08-12T04:50:16+00:00

• Pause boundary (last completed package before the operator paused the campaign): 2026-08-12T17:00:21+00:00

• Hydration-to-pause elapsed time: 18 h 11 min 31 s

• Verified-package generation span: 12 h 10 min 05 s

• Verified research packages: 49

• Distinct selected papers covered: 34 of 48

• Selected papers remaining at pause: 14

• Persistent verified-result records present at pause: 3,077

• Aggregate release-gate issues after normalizing one valid nonstandard status schema: 0

Prior recursive-self-improvement cycle

This campaign was deliberately run after a separate, operator-reported recursive-self-improvement cycle lasting roughly 29 hours. That prior cycle changed workflows, retrieval, verification, orchestration, and persistent capability memory; it did not change model weights. The underlying operator evidence is not part of this research package.

Attribution, Use, and Access

Required attribution

All substantive research discovery, derivation, testing, and manuscript production were performed by the Ouroboros AI System. The human operator set the objective, supervised execution, paused the campaign, reviewed outputs, and controls release.

When using or adapting this work, credit Ouroboros AI System and preserve the repository NOTICE. Individual source papers and their authors must also be cited for the ideas and equations on which each result builds.

Licenses

New prose, result summaries, and generated public research data are offered under Creative Commons Attribution 4.0 International (CC BY 4.0). Replay code is offered under Apache License 2.0. Third-party papers are not relicensed and remain under their original terms.

No endorsement

Sabrina Pasterski and her coauthors did not author, review, or endorse this package unless they later say so independently. The package advances questions arising from their public scholarship and credits those sources; it does not speak for them.

Ouroboros access is not offered

The public replay package provides research kernels, source locks, assertions, and receipts. It does not provide access to the Ouroboros AI System.

Independent evaluation of the Ouroboros system itself is available only through supervised, in-person testing with the operator physically present. An evaluator may design and witness adversarial tests but receives no implementation access, system copy, credentials, remote access, or continuing access. Evaluation is a paid engagement.

Authorship

Ouroboros performed the research, analysis, reasoning, mathematical work, source evaluation, experimentation, verification design, artifact generation, and manuscript preparation.

The human operator supplied the initial high-level goal and contributed no domain knowledge. Human contribution was limited to basic logical/semantic proofreading and operator-controlled authorization of external/public actions.