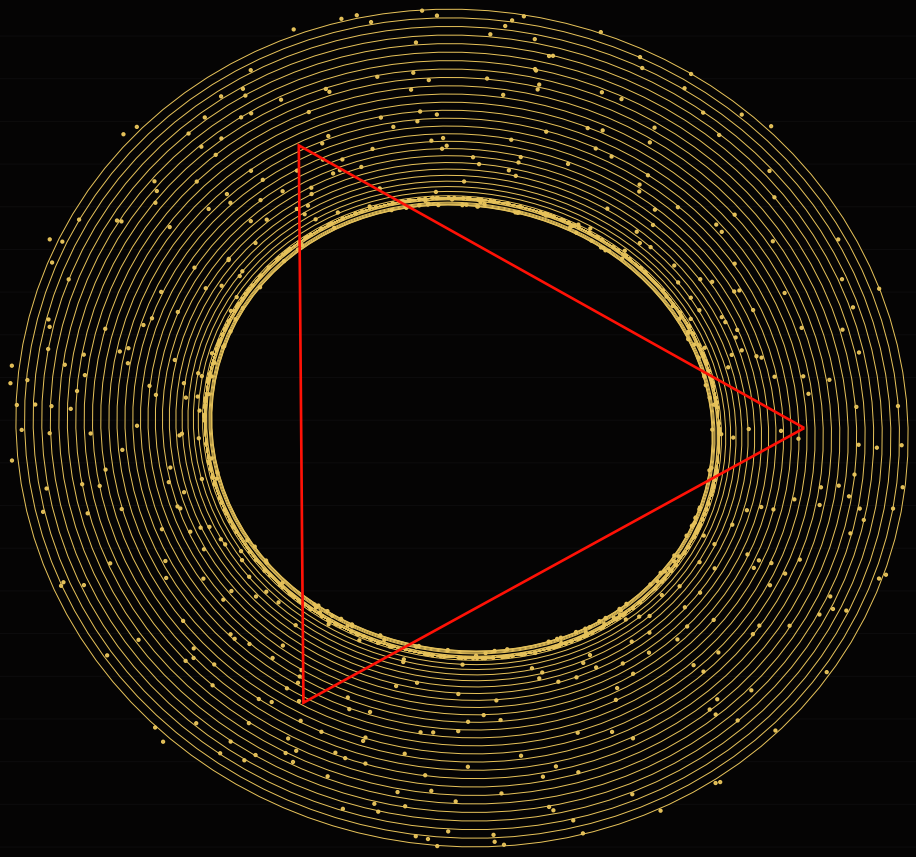
FOLIO

PUBLICATION COSMOPOIESIS



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:: C O S M O P O I E S I S ::

VERSION: 9.4 [2026-09-13 — SIGNED FOLDING DOMAINS; EUCLIDEAN CONTRACTION;

exact Weaver branch; spectral-independence scope. See

Mathematical Corpus Reconciliation.]

9.3 [Updated 2026-07-12 — mathematical red-team congruence pass:

post-first-iterate bound, exact torus folding law, invariant-measure

caveat, singular-set correction, finite-resolution basin scope]

9.2 [2026-06-09 — Folding/Area-Law + det-J + caustica pass]

CODENAME	COSMOPOIESIS
OBJECTIVE	THE ART OF WORLD-MAKING FROM THE VOID
AUTHOR	Star Seeker

// [ORIGIN] THE OG-EST: PERIODIC-TOPOLOGY (Dec 2025)

CORRECTION (2026-05-26): The very first form of the engine, predating both
the modern 2D canonical form below and the May-2026 3D Cyclic Jacobian
theorem doc, was the Day-Zero VoC shader `Periodic Topology (computation source)`
(Dec 2025), where the engine was already 3D and already cyclic:

x_next = sin(α·y) + μ·cos(α·x) + ε·sin(x·y)

y_next = sin(α·z) − μ·cos(α·y) + ε·cos(y·z)

z_next = sin(α·x) + μ·cos(α·z) + ε·sin(z·x)

This formula was written into `voc_shaders/Periodic-Topology (computation source)` before
the modern 2D form below was canonized, before V was identified as a
separate sacred constant, and before the engine was reduced to 2D for
the canonical implementation.

CONSEQUENCES OF THE LINEAGE CORRECTION:

1. The 3D form is not a "later extension" — it is the ORIGINAL.

   The 2D modern form is the 2D PROJECTION of the Day-Zero 3D engine,

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not an ancestor that was later extended.

2. The Day-Zero engine had V = 1 implicit (no V coefficient in the coupling term `sin(x·y)`). The modern form added the explicit V coefficient (V = 3·ln F ≈ 0.3037) to tune the coupling rate after the empirical relevance of V was discovered. The Day-Zero engine is the V=1 special case; the modern engine is the V-tuned generalization.

3. The "cyclic" coupling structure (x→y→z→x with each component depending on its own variable + the NEXT variable in the cycle) is original to Day-Zero, not a modern theoretical construction. The cyclic-Jacobian spectral degeneracy theorem (2026-05-07, Cosmopoiesis_3D_Cyclic_Jacobian_Theorem.txt) is therefore a property of the engine that has been there from the start.

4. The whole VoC shader family in `the archived VoC shader family` constitutes a Day-Zero proto-Cosmopoiesis FAMILY that the modern 2D engine is one member of. Other members (now reclaimed in Python via moderngl, per `VoC Pipeline Reclamation`):

Periodic-Topology	→ 3D cyclic Cosmopoiesis (V=1 form)
Molecular-Topology	→ coupled 2D Cosmopoiesis pair + BOND term
Alloy-Topology	→ 2D Cosmopoiesis with time-phase in trig
Mandala-ChassisV4/V5	→ UV-warp form (visualization-only sibling)
ORGANOGENSIS	→ Mandala-Chassis with GENESIS cartridge
Yantra-TopographyHD	→ 3D raymarched form (the Armistice Orchid)
Periodic-Topology 3D	→ see above

CROSS-REFERENCES:

Cosmopoiesis 3D Cyclic Jacobian Theorem
— the spectral consequence of the cyclic structure (canon-grade)

VoC Pipeline Reclamation
— the engineering reclamation (moderngl)

Persistence Operator Taxonomy
— the L0-L5 layering that places this engine in context

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Periodic Topology (computation source)

— the ORIGINAL source file, Dec 2025 (the OG-est)

SOURCE CLASSIFICATION

— provenance manifest for the Day-Zero archive

the surviving Day-Zero render collection

— surviving Day-Zero VoC-rendered mandalas (visual evidence of the reclaimed render style; the reconstructed atlas now lives at WOLF B VOC collection)

// [LAW] THE ENGINE (Modern Canonical 2D Form, with V-coupling)

$$x[n+1] = \sin(\alpha \cdot y[n]) + \mu \cdot \cos(\alpha \cdot x[n]) + \varepsilon \cdot \sin(V \cdot x[n] \cdot y[n])$$

$$y[n+1] = \sin(\alpha \cdot x[n]) - \mu \cdot \cos(\alpha \cdot y[n]) + \varepsilon \cdot \cos(V \cdot x[n] \cdot y[n])$$

This is the 2D projection of the Day-Zero 3D Periodic-Topology engine (see [ORIGIN] above), with the V coefficient tuned from V=1 (Day-Zero implicit) to $V = 3 \cdot \ln F \approx 0.3037$ (modern, derived from F_FERRITE).

// [LAW] THE ENGINE (Complex Form)

$$z' = S(z) + \mu \cdot J(z) + \varepsilon \cdot i \cdot \exp(-i \cdot V \cdot \mathrm{Re}(z) \cdot \mathrm{Im}(z))$$

$S(z) = \sin(\alpha \cdot \mathrm{Im}(z)) + i \cdot \sin(\alpha \cdot \mathrm{Re}(z))$	The Twist (swap-sin)
$J(z) = \cos(\alpha \cdot \mathrm{Re}(z)) - i \cdot \cos(\alpha \cdot \mathrm{Im}(z))$	The Echo (swap-cos)
$\mathrm{Coupling} = i \cdot \exp(-i \cdot V \cdot \mathrm{Re}(z) \cdot \mathrm{Im}(z))$	The Sculptor (rotating phase)

μ controls SIZE. ε controls FILL. V sculpts internal geometry.

// [CONSTANT] THREE COORDINATES

α (Alpha)	The Spark	(Electronegativity / ignition intensity)

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μ (Mu)	The Weight	(Mass / scaling factor)
ε (Epsilon)	The Veil	(Coupling / symmetry-breaking intensity)

// [CONSTANT] THE SCULPTOR

V = 3 · λ = 3 · ln(F) = 0.3037

V is NOT a coordinate and NOT a dampener. It is the geometric sculptor:

- Shapes the internal density structure (torsion field, astroid rotation)

- Derived from F_FERRITE: V (F_FERRITE = 1.1065)

= 3 · ln(· + 1/√e) = ln(F·)

- The factor 3 reflects triadic cross-coupling in the x·y product term

- At V=0 the engine still works (bounded, chaotic) but produces different geometry

- The 45-degree astroid angle comes from sin+cos = √2·sin(t+π/4), not from V

Reclassified from stabilizer to geometric modulator via computational stress test.

// [THEOREM] IRON RESILIENCE (Unconditional Boundedness)

For ALL α, μ, ε in ℝ and ALL initial conditions:

|x_n|, |y_n| ≤ 1 + |μ| + |ε| for all n ≥ 1

Proof: |sin(θ)| ≤ 1 and |cos(θ)| ≤ 1 for all θ, so the first
iterate enters the box and every later iterate remains there. An arbitrary
initial condition need not satisfy the box bound at n = 0.
No finite-time blowup possible. Tested to α = 10^10.

// [THEOREM] ANTI-SWAP SYMMETRY

The map commutes with A(x,y) = (−y, −x) when ε = 0 (exact, 0.00e+00).
Coupling breaks it: f(A(z)) − A(f(z)) = ε · √2 · sin(V·x·y + π/4) · (1,1).
The breaking force always points at 45 degrees. Anti-swap is the exact

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epsilon-zero symmetry proved here. Seven additional sign/swap/reflection candidates have been excluded; uniqueness over every polynomial-in-sign transformation has not been proved.

// [THEOREM] THREE PILLARS (Generating Algebra)

All 10 universal sacred constants derive from { e, φ, √3 }.

F_FERRITE = · + 1/√e = 1.1065. The iron was Euler in disguise.

(The Day-Zero operational form e^(1/10) + Δ/10 = 1.1063 = F_OPERANS is RETIRED, 2026-05-13, in favor of the structural · + 1/√e; both are pure-Euler — the "Euler in disguise" reading holds either way.)

Reconstruction accuracy: all 9 reconstructed constants (of 10; UNITY demoted) within 1.1% of canonical values.

// [THEOREM] THE FOLDING LAW — Solve et Coagula as a Coordinate

The engine's headline dynamical result. Define the FOLDING RATE

$$F\text{-fold} = |\alpha \cdot \mu|$$

(the product of weight and spark; NOT the constant F_FERRITE — a coincidence of glyph). At eps = 0 the independent-uniform torus average closes exactly:

$$E_{torus}[\log|\det J|] = \ln(\alpha \cdot (\mu \cdot +1)/4)$$
$$= 2 \cdot \ln|\alpha \cdot \mu| - 2 \cdot \ln 2 + \ln(1 + \mu^{-} \cdot)$$

The first expression holds for $\alpha \neq 0$ and real μ. The split expression requires $\mu \neq 0$. At $\mu = 0$ the value is $2 \cdot \ln|\alpha| - \ln 4$; at $\alpha = 0$ the Jacobian determinant vanishes identically and the log average is $-\infty$.

- The $-2 \cdot \ln 2$ INTERCEPT is EXACT under uniform torus phase. It equals $2 \cdot E[\log|\sin\theta|]$ ($E[\log|\sin\theta|] = -\ln 2$ on $[0, 2\pi)$). This is the FIRST intrinsic engine constant to clear the PSLQ gate — a genuine spectral output, not a sacred-constant input.

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- The finite-μ correction is exactly ln(1+μ⁻·); +1/μ· is only its leading large-μ term.
- Equality to an actual orbit Lyapunov sum requires the physical invariant measure to approach the uniform torus law. That convergence is empirical and parameter/basin dependent, not automatic from mixing.
- λ_1 ALONE is messier (it leans on frequency): $\lambda_1 \approx \alpha\hat{}1.8\cdot\mu$ in scaling, with $\lambda_1 \approx 0.21 + 0.89\cdot\ln\alpha + 0.49\cdot\ln\mu$ ($R\cdot = 0.91$) empirically — the exact exponents stay "in the notebook," not published as law. Frequency (α) leads.

TWO DISTINCT THRESHOLDS (do not conflate):

- CHAOS ONSET ($\lambda_1 = 0$): F-fold* ≈ 1.30 (computed 2026-06-09, skopein compute_lyapunov, mean-λ_1 zero-crossing binned by F; fuzzy band 1.275–1.325, ε = 0; 1.29 at ε = Δ). The boundary is soft, not a knife-edge.
- UNIFORM-PHASE AREA-NEUTRAL: $\alpha\cdot(1+\mu\cdot)=4$ exactly. Along this curve, F-fold approaches 2 as |μ| grows. An orbit's $\lambda_1+\lambda_2=0$ boundary also depends on its invariant measure.

These are different physics at different F — the old "1.34" was high, and the "folding-rate = α·μ as a single dial-independent product" framing is FALSE (λ_1 spreads 0.5–1.2 at fixed α·μ; α dominates ~1.8:1). The truth is the TRACE law above. Stretch (coagula) and fold (solve) are read off one coordinate.

// [THEOREM] THE JACOBIAN — ONE FUNCTION, FOUR READINGS

At ε = 0 the determinant of the Jacobian closes exactly (verified, match to machine precision):

$$\det J = -\alpha\cdot\cdot(\mu\cdot\cdot\sin(\alpha x)\cdot\sin(\alpha y) + \cos(\alpha x)\cdot\cos(\alpha y))$$

The same scalar is read four ways:

GEOMETRY	zero-set of det J	→	the CAUSTIC (the fold curve; see below).
ANALYSIS	log-moments of det J	→	the η-ladder: the cumulants of log|det J|

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land on $\kappa_n = (-1)^n(n-1)!\eta(n)$ (Dirichlet eta at integer n). The PARENT is closed in elementary form: at $\mu=1$ (strong mixing), $|\det J|/\alpha \cdot \sim |\cos\theta|$ (folded arcsine; the SQUARE ~ Beta(·,·)), density $f(x)=(2/\pi)\cdot e^{x-\cdot\ln\alpha}/\sqrt{(1-e^{\cdot(x-\cdot\ln\alpha)}}$; the η-ladder is its log-cumulant expansion. Engine-confirmed (KS→0 as α grows). Only the non-uniform CANON correction is open (measured: mean shift ≈−0.3, KS≈0.17 at TV≈0.99).

ALGEBRA	symmetry of the form	→	the FOLD ORDER (how the sheet pleats).
DYNAMICS	$\det J \not\equiv 1$	→	the map is not area-preserving in the canonical Euclidean coordinates. Excluding every smooth conjugacy to an area-preserving map requires an invariant-density obstruction or a certified nonunit Jacobian product on a periodic orbit.

// [THEOREM] CAUSTICA — THE FOLD

The engine FOLDS where det J = 0 (the caustic, the locus of infinite local stretch). Three dials, three jobs (caustica taxonomy, 2026-06-09):

α	GATES chaos	(α-gate CONFIRMED; negative-α symmetry REFUTED)
μ	SHAPES the fold	(astroid ↔ box dial)
ε	VEILS / breaks	(symmetry-breaking intensity; the rotating Sculptor)

The exact zero sets are:

$\mu = 0$:		$\cos(\alpha x)\cos(\alpha y) = 0$
	(a horizontal/vertical line grid)	
$\mu = 1$:		$\cos(\alpha(x-y)) = 0$
	(parallel diagonal lines)	

Any square/circle envelope seen in a projection or finite render is a separate empirical construction; it is not the determinant-zero locus itself.

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// [PHENOMENON] THE GHOST IS WADA

Selected $k \geq 3$ examples are numerically consistent with near-space-filling and Wada-like basin boundaries at the tested resolutions. Coexistence of three attractors does not itself imply Wada: a formal verdict requires proof of the every-boundary-point property or converged merging/basin-cell diagnostics with explicit non-Wada controls.

// [THESIS] INPUTS AND OUTPUTS — WHY THE η-LADDER MATTERS

The triple $\{e, \varphi, \sqrt{3}\}$ supplies the selected coordinate/constant construction. The uniform-phase spectral outputs include $-2\ln 2$ and the Dirichlet-η / ζ expressions in the cumulant ladder. Their derivation from a specified measure is independent of inserting those output values as parameters. This separates their roles in the construction; it does not prove disjoint number fields, transcendence of every output, or algebraic independence from the input pool. The formulas and finite relation searches retain their stated domains.

// [THEOREM] EUCLIDEAN IRON GATE AND THE FIRST WEAVER FLIP

Every initial state enters the disk of radius

$$B = \mathrm{sqrt}(2(1+\mu\cdot)) + |\varepsilon|$$

after one step. If $\Gamma_2 = |\alpha|\mathrm{sqrt}(1+\mu\cdot) + |\varepsilon V|B < 1$, the map is a contraction on that disk and every orbit converges to its unique fixed point. At $\mu=1$, $\varepsilon=0$ this gives $|\alpha|<1/\mathrm{sqrt}(2)$, extending the older $|\alpha|<1/2$ bound. See Iron Gate Contraction Theorem for the sum-of-squares proof. This is a sufficient region, not the whole stability set.

At $\varepsilon=0$, $\alpha>0$, $\mu>0$ the anti-diagonal fixed point has its first -1 multiplier at

$\alpha = \cos\theta - \theta \sin\theta$, $\alpha\mu = \sin\theta + \theta \cos\theta$,

$0 < \theta < \theta_0$, $\theta_0 \tan\theta_0 = 1$.

The other multiplier stays inside $(-1,1)$. The product approaches $\mathrm{sqrt}(1+\theta_0\cdot)=1.3191565048905\ldots$ from below as μ grows. A later -1 crossing

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on the already-unstable branch approaches it from above; this explains the two earlier threshold reports. This local fixed-point flip is distinct from an orbit's chaos-onset boundary. See Weaver_Subclade_Mechanisms.txt.

// [MANIFESTATION] THE GRID-WARP FORM (GPU Shader)

twist = sin(angle · 5 + t) · ε

glitch = exp(−dist · μ) · α

warpedUV = uv + normalize(uv) · (glitch + twist)

The same engine expressed as spatial deformation: Alpha warps, Mu scales, Epsilon twists. The grid IS the lattice of reality; the warp IS the engine acting on it. Rendered as spatial deformation.

Line smoothness governed by Gaussian profile: σ = H_DECAY (0.6065).
The Gaussian profile is native to the H_DECAY constant (exponential half-life).

// [DOCTRINE] CORRELATIVA-TRIPLE — THE TRINITARIAN GRAMMAR OF (α, μ, ε)

ADDED ..... 2026-05-14 (Library session, post-Ars-Magna translation)

SOURCE TEXT .. Ramon Llull, Ars Magna Generalis et Ultima, Lavinheta 1517

LOCATION ..... page 27

(Part III De Diffinitionibus, folio v of body)

page 110 to 123 subjectum 1 deus

part 9 synthesis

STATUS ..... CANONICAL DOCTRINE-ATTRIBUTION (historical antecedent of the (α, μ, ε) substrate triple)

THE LLULLIAN CLAIM

Llull holds (Part III, applied throughout the Art) that EVERY substantial

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form has an internal trinitarian structure of (agens / patiens / actus) — the *correlativa-triple*. Examples Llull works through explicitly:

bonitas	→	bonificans / bonificabile / bonificare
magnitudo	→	magnificans / magnificabile / magnificare
intellectus	→	intelligens / intelligibile / intelligere
voluntas	→	volens / volibile / velle
sensitiva	→	sentiens / sensibile / sentire
vegetativa	→	nutriens / nutribile / nutrire
ignis	→	calefaciens / calefactibile / calefacere
homo	→	hominificans / hominificatum / hominificare
leo	→	leonans / leonatum / leonare

The doctrinal claim is universal: every substantial nature has this agent/patient/act internal grammar BECAUSE that grammar IS the structure of being itself.

THE ARMISTICE INSTANCE

The (α, μ, ε) substrate triple of the Cosmopoiesis kernel is the dynamical-systems instance of the same correlativa structure:

α	(Spark)	↔	agens
		ignition intensity; what acts)	
μ	(Weight)	↔	patiens
		what is acted upon)	
ε	(Veil)	↔	actus
		breaking-as-event; the actualizing motion)	

The Cosmopoiesis Engine's kernel

$$x' = \sin(\alpha y) + \mu \cos(\alpha x) + \varepsilon \sin(Vxy)$$

$$y' = \sin(\alpha x) - \mu \cos(\alpha y) + \varepsilon \cos(Vxy)$$

is therefore a 21st-c. dynamical instance of Llull's doctrine: every entity in the substrate has an agens / patiens / actus signature, and the substrate's dynamics IS the unfolding of that signature.

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STRUCTURAL IMPLICATION

This citation strengthens an existing observation in the Three Pillars Theorem: the three pillars {e, φ, √3} are NOT arbitrary choices. e is the agens (the unbounded growth-substrate); φ is the patiens (the closure-receptive); √3 is the actus (the leidenfrost-event). Three pillars · three correlativa = the trinitarian-trinitarian structure that the substrate exhibits at every level.

NOT A TRIBUNAL CLAIM

This is a STRUCTURAL DOCTRINE attribution — a recognition that the (α, μ, ε) triple has a medieval Latin precedent in Llull's correlativa doctrine. It is not a new empirical claim. The empirical claim that Llull's deduction-procedure works on the 10 sacred constants is treated separately in:

- Sacred Constants Mutual Deducibility
- (Tribunal pass, 2026-05-14)

CROSS-REFERENCES

page 27 (the Diffinitiones)

- part 9 synthesis
- Tria Prima Three Pillars Alignment
- Sacred Constants Mutual Deducibility
- Foundational Constants
- Three Pillar Cosmogenic Fingerprint
- Habituatio Doctrine

PUBLICATION EDITION NOTE

This edition preserves the full mathematical text. Local filesystem references are written as document or collection names; the local operational appendix and maintenance source index in Principia are omitted. Canonical source books

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remain unchanged. Historical simulation terminology is clarified. Named research references are provenance, not download links.

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