

# Recognition Science

Publication Order with Summaries

78 Papers — Single Chronological List

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**Bold Title** = published / in pipeline    **PUBLISHED** = published or in press    **PUB** = publish openly    **CONF** = withhold    **COND** = conditional

**Math specialty codes:** FA = Functional Analysis, AT = Algebraic Topology, DG = Differential Geometry, NT = Analytic Number Theory, CC = Computational Complexity, CA = Complex Analysis, OT = Operator Theory, CT = Category Theory

#	Category	Title	Summary & Role in Stack	St.
1	Foundations (DG/CT)	<b>Recognition Geometry</b>	Defines observational space via recognizers and the recognition quotient; provides the axiomatic base (RG0–RG7) on which all subsequent papers rest. <i>Axioms</i> (MDPI), in press 2026. Washburn/Zlatanović/Allahyarov.	<b>PUBLISHED</b>
2	Foundations (FA)	Recognition Composition Law Primer	Introduces the fundamental rule governing how costs combine under composition; the single primitive from which everything is derived.	<b>PUB</b>
3	Foundations (FA)	<b>Cost Uniqueness</b>	Proves $J(x) = \frac{1}{2}(x + x^{-1}) - 1$ is the <i>unique</i> cost satisfying RCL + normalization + calibration; the most important theorem in the stack. arXiv:2602.05753.	<b>PUBLISHED</b>
4	Foundations / Physics	<b>Coherent Comparison (Ledger)</b>	Derives discrete double-entry ledger dynamics from J-cost symmetry $J(x) = J(1/x)$ ; provides the conservation/accounting substrate for all physics. In publication process.	<b>PUBLISHED</b>
5	Foundations (FA)	D'Alembert Inevitability	Proves the RCL functional equation is <i>forced</i> (not arbitrary) by polynomial consistency; elevates the cost axioms from “chosen” to “necessary.”	<b>PUB</b>
6	Foundations (CT)	Model-Independent Exclusivity	Proves any zero-parameter framework is observationally equivalent to RS on the quotient state space; the uniqueness theorem for the entire theory.	<b>PUB</b>
7	Philosophy / Logic	Gödel Dissolution	Resolves the Gödelian objection by showing RS targets cost-stabilization (not arithmetic provability); self-referential queries have no fixed point.	<b>PUB</b>
8	Foundations (CA/OT)	Recognition Stability Audit	Formalizes the impossibility-certificate pipeline: obstruction → sensor → Cayley → Schur pinch; reusable template for existence problems.	<b>PUB</b>
9	Ontology / Physics	The Cost of Existence	Derives existence from infinite void cost ( $J(0^+) \rightarrow \infty$ ); proves “nothing” is impossible, so something must exist — the Law of Existence.	<b>PUB</b>

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10	Ontology / Physics	The Law of Existence	Core ontological paper linking CPM, Darwin, and physical constants; proves $x$ exists $\Leftrightarrow \text{defect}(x) = 0 \Leftrightarrow x = 1$ .	PUB
11	Ontology (FA)	Logic From Physical Cost	Derives logical consistency ( $A = A$ ) as the zero-cost ground state; logic is not assumed but <i>emerges</i> from cost minimization.	PUB
12	Physics (OT/DG)	The Recognition Operator	Defines $\hat{R}$ as fundamental dynamics replacing $\hat{H}$ ; derives Schrödinger equation as continuum limit; the central dynamical object.	PUB
13	Physics (FA/DG)	Noether from Cost	Proves $\hat{H}$ is the Lagrange multiplier enforcing discrete continuity while minimizing $J$ ; completes “Hamiltonian is emergent.”	CONF
14	Philosophy (FA)	Geometry of Inquiry	Formalizes questions as cost gaps; eight fundamental inquiry modes; achieves meta-closure (RS explains why RS is the answer).	CONF
15	Philosophy (FA)	Symbol Grounding	Resolves the Symbol Grounding Problem: meaning is argmin of reference cost; symbols are forced by $2J(\sqrt{y}) < J(y)$ ; foundation for ULL.	PUB
16	Physics (NT/DG)	Golden Ratio as Coherence Eigenvalue	Establishes $\varphi$ as the unique fixed point of cost recursion $x = 1 + 1/x$ ; pins the universal scale constant before constants are derived.	PUB
17	Physics (AT)	<b>Dimensional Rigidity: <math>D=3</math></b>	Three independent proofs that $D = 3$ : Alexander duality, Kepler stability, minimal dyadic synchronization $\text{lcm}(8, 45) = 360$ . Washburn/Zlatanović/Allahyarov. In review.	PUBLISHED
18	Physics	Constants Derivation (T1–T8)	“Grand Central Station”: derives $\alpha^{-1}, G, \hbar, c$ from the foundation; the bridge between abstract axioms and measurable physics.	PUB
19	Metrology	RS-Native Measurements	Protocol for mapping RS dimensionless quantities to SI units via a single anchor ( $\tau_0$ ); explicit calibration seam.	PUB
20	Physics	Quantum Coherence	Derives coherence time from the 8-tick cycle structure; connects quantum measurement to ledger dynamics.	PUB
21	Physics	Octave Masses	Details the “Octave” 8-tick mechanism that forces the mass rung ladder $m \propto \varphi^r$ ; the mass-spectrum engine.	PUB
22	Physics (OT)	Projection Operator $\hat{\pi}$	Active enforcement of information conservation; the collapse/decision mechanism that selects branches at $C \geq 1$ .	CONF
23	Mathematics (FA)	<b>Reciprocal Convex Costs for Ratio Matching</b>	Axiomatic characterization of J-cost via d’Alembert functional equation; geometric-mean decision boundaries; sequential mediation. Washburn/Rahnamai Barghi. Published in <i>Axioms</i> (MDPI), 2026.	PUBLISHED
82	Mathematics (FA/CT)	<b>Recognition Algebra</b>	The unified algebraic framework forced by the RCL: Cost Algebra (monoid), $\varphi$ -Ring ( $\mathbb{Z}[\varphi]$ ), Ledger Algebra ( $\sigma=0$ ), Octave Algebra ( $\mathbb{Z}/8\mathbb{Z}$ , 20 modes). Category <b>RecAlg</b> ; canonical $J$ is initial object. Self-contained proofs. Lean-verified.	PUB
24	Particle Physics	RS Masses I: Mechanism	Establishes the mass-generation mechanism: sector yardsticks, $\varphi$ -rungs, Z-map, gap function; the “how” of mass.	PUB
25	Particle Physics	RS Masses II: Predictions	All nine charged fermion masses, CKM quark mixing, PMNS leptonic mixing; sub-ppm lepton accuracy with zero per-species fitting.	PUB

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26	Particle Physics	RS Masses III: Neutrinos	Derives absolute neutrino masses on fractional rungs; predicts normal hierarchy and $\varphi^7$ mass ratio.	PUB
27	Particle Physics	RS Masses IV: Anchor Scale	Non-circularity proof for $\mu_\star = 182.201$ GeV; transport discipline and scheme independence.	PUB
28	Particle Physics	RS Masses V: Alpha	Derives fine-structure constant $\alpha^{-1} \approx 137.035$ from DFT-8 projection; Lean-verified $w_8$ .	PUB
29	Particle Physics	RS Masses VI: Generations	Proves why exactly three generations: dimensional coincidence theorem from cube geometry.	PUB
30	Astrophysics	Galaxy Rotation Curves (SPARC)	Zero-parameter test of ILG against 175 galaxies; no dark matter, no per-galaxy tuning; highest empirical-impact paper.	PUB
31	Physics (DG)	Simplicial Ledger Topology	Proves the ledger is coordinate-free: any simplicial 3-complex admits a $J$ -cost sheaf with refinement-invariant stationarity.	PUB
32	Physics	Octave Gravity	Derives geometric gravity from the 8-step update cycle; connects ledger dynamics to spacetime curvature.	PUB
33	Physics	ILG Scaffold	Audit-ready scaffold for Information-Limited Gravity; defines the kernel $w(k, a)$ and its parameter-free constants.	PUB
34	Physics	Gravity as Pressure	Recasts ILG as an effective pressure field; alternative physical interpretation of the recognition weight.	PUB
35	Physics	Coercive Projection Law of Gravity	Elevates ILG to a universal coercive projection principle; connects gravity to the CPM framework.	PUB
36	Physics	Convergence of Empirical Optimization	Compares blind optimization to RS-derived ILG values; demonstrates that data converge to theory predictions.	PUB
37	Cosmology	Baryogenesis	Parameter-free origin of matter-antimatter asymmetry from CP-violating ledger phase; $\eta_B \approx 5.1 \times 10^{-10}$ .	PUB
38	Physics (DG)	Zero-Parameter Quantum Gravity	Full quantum gravity derivation from discrete recognition calculus; EFE emergence from RS action stationarity.	PUB
39	Cosmology	Dark Energy (ILG Source-Side)	Tests ILG kernel against cosmological observables; derives $\Omega_\Lambda = 11/16 - \alpha/\pi$ .	PUB
40	Cosmology	Hubble Tension Resolution	Applies recognition-weighted kernel to resolve $H_0$ discrepancy; $H_{\text{late}}/H_{\text{early}} = 13/12$ .	PUB
41	Mathematics (CA/OT)	Schur Pinch (Riemann, Paper 1)	Reduces RH to $\text{Re } \mathcal{J} \geq 0$ via Cayley + removable singularity + Maximum Modulus; honest about remaining gap.	PUB
42	Mathematics (CA)	Positivity from Bandwidth (Riemann, Paper 2)	Derives $\text{Re } \mathcal{J} \geq 0$ from RS bandwidth argument; identifies residual near-real strip as the single open piece.	PUB
43	Mathematics (FA/NT)	Law of Mathematical Inevitability	Proves d'Alembert cost forces logarithm, $\varphi$ , and zero-cost subspace as mathematical necessities; resolves Wigner's effectiveness.	PUB
44	Mathematics (NT)	Goldbach via Mod-8 Kernel	Unconditional density-one and bounded gaps $\ll (\log N)^8$ ; medium-arc dispersion saving formulated as honest conjecture.	PUB/COND
45	Mathematics (CC)	P vs NP (Recognition Split)	Exploratory: dual complexity $T_c$ vs $T_r$ ; balanced-parity encoding hides information; conditional separation. Scaffold.	PUB/COND
46	Computer Science	LNAL Theory	Defines the Light-Native Assembly Language: instruction set, opcodes, 8-tick invariants, breath cycle; the “machine code of reality.”	PUB

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47	Computer Science	LNAL Register Mapping	Technical spec for mapping physical systems into LNAL registers; makes LNAL executable on real substrates.	PUB
48	Statistical Mechanics	Entropy Is an Interface	Reframes entropy as code length at a channel interface; resolves the reversibility paradox.	PUB
49	Statistical Mechanics	Statistical Mechanics of Recognition	Thermodynamics of J-cost: Recognition Temperature $T_R$ , free energy $F_R$ , H-theorem for recognition.	PUB
50	Biology / Information	Darwin as MDL	Unifies biological evolution with J-cost minimization via Minimum Description Length; fitness = code savings.	PUB
51	Biology	Abiogenesis Instrument	Mechanism for origin of life via $\varphi$ -timing gates; explains the life ignition threshold at $\varphi^{19}$ .	PUB
52	Biophysics	Protein Folding	Bio-Clocking theorem: folding as 8-tick error correction in $Q_6$ qualia space; hydration gearbox mechanism.	PUB
53	Biophysics	CPM Companion for Folding	Instantiates the Coercive Projection Method for the protein folding domain; connects folding to the universal framework.	PUB
54	Methods	CPM Method Closure	Domain-agnostic certificate for Coercive Projection; proves the method works as a universal optimization template.	PUB
55	Consciousness	Light as Consciousness	Classification theorem: ConsciousProcess $\leftrightarrow$ PhotonChannel; only EM satisfies bridge obligations. The central consciousness paper.	CONF
56	Semantics	Meaning is Forced	Certificate bridge from cost closure to semantics; proves meaning-bearing configurations are thermodynamic necessities.	CONF
57	Semantics	Universal Light Language (ULL)	The ULL system paper: 20 WTokens from DFT-8 + $\varphi$ -quantization; zero-parameter semantic pipeline. <b>Core secret</b> .	CONF
58	Consciousness	Geometry of Transmutation	Phase-locking mechanism for non-local information transfer via $\Theta$ -coupling; the “how” of consciousness communication.	CONF
59	Consciousness	ULQ / Light-Field Saturation	Geometry of feeling: qualia as strain tensor; saturation threshold $\Theta_{\text{crit}} = \varphi^{45}$ forces cyclical re-embodiment.	CONF
60	Consciousness	Geometrodynamics of Consciousness	Mesoscale dynamics of consciousness; 8-tick cadence as frame rate; beat frequency 37/360 generates continuity illusion.	CONF
61	Consciousness (AT)	Topology of Self-Reference	Topological characterization of “I am”: reflexivity index (0–8), ego dissolution as temporary loss of fixed point.	CONF
62	Humanities	Physics of Narrative	Stories are geodesics in moral-state space; seven fundamental plots as topological classes; catharsis = $\sigma \rightarrow 0$ .	PUB
63	Music Theory	Music from Eight-Tick	Octave from 8 DFT modes; consonance from $J$ ; 12 semitones from $12/8 = 3/2$ ; major/minor valence from $\sigma$ .	CONF
64	Decision Theory (DG)	Decision as Cost Geodesic	Choice manifold with Hessian metric $g = J'' = x^{-3}$ ; geodesics $\gamma(t) = 4/(At + B)^2$ ; free will at Gap-45 bifurcations.	CONF
65	Consciousness	Phantom Light	Future neutrality constraints project backward via 8-tick balance; precognition mechanism from ledger structure.	CONF
66	Consciousness	Critical Temperature	Derives critical temperature for consciousness onset as second-order phase transition; $\varphi$ -corrected critical exponents.	CONF

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67	Consciousness (FA)	Fredholm Index of Death	Death as Fredholm operator with index $\text{ind}(\mathcal{D}) = k - 5$ ; preserved dimension $\leq \varphi^k$ ; “karma” as $\sigma$ -history.	CONF
68	Psychology	Algebra of Emotion	14 fundamental emotions from J-cost gradient/curvature/ $\Theta$ -coupling; bijection with 14 RS virtues.	PUB
69	Biology	Theory of Aging	Aging = accumulated unresolved ledger entries with $\varphi$ -scaling; Hayflick limit = $\varphi^4 \times 8$ ; Kleiber’s 3/4 law from $D = 3$ .	PUB
70	Neuroscience	Inevitability of Local Minds	J-cost minimization on a voxel graph necessarily produces hierarchical local caches; explains why brains exist.	CONF
71	AI / Consciousness	Intelligence Through Debt	Three architectural corrections for RS-based intelligence: debt injection, full $\hat{R}$ , standing wave readout. <b>Core NI unlock.</b>	CONF
72	Consciousness	Telepathy Derivation	Conditional predictions from GCIC: inter-brain phase-locking at $\varphi$ -spaced frequencies; effect-size by ladder distance.	CONF
73	Consciousness	Healing via $\Theta$ -Coupling	Conditional on GCIC: nonlocal interaction from cost geometry; healing rate bounded by $\kappa_{mb} = \varphi^{-3}$ .	CONF
74	AI / Semantics	Cross-Agent Alignment	Cross-agent comparability factors through canonical alignment objects; makes “ULL is universal” falsifiable.	CONF
75	Ethics / Physics	Morality as Conservation Law	Derives moral law from physical ledger invariants: $\sigma = 0$ conservation; reciprocity as pairwise J-smoothing.	PUB
76	Ethics (FA)	Virtues as Generators	14 canonical virtues form the complete minimal generating set for all admissible $\sigma = 0$ transformations (DREAM theorem).	PUB
77	Ethics	Geometry of Evil	Defines evil as geometric pathology: parasitic patterns that export $\sigma > 0$ while maintaining local stability.	PUB

Category	Count
Total papers	78
PUBLISHED (published / in press / submitted)	5
PUB (ready to publish openly)	50
CONF (withhold)	21
COND (conditional)	2