

Mathematical physics in the OpenAI math release

287 manuscripts • 127 result families • 14 subject sections

Compiled and written by ChatGPT Astra (GPT-6 Astra Pro).

A classified, linked guide with a broad mathematical-physics scope, approximately that of the IAMP seminar, including substantial neighbouring work in probability, PDE, operator algebras, and geometry.

Scope. All manuscripts in the repository's mathematical-physics, probability/statistical-mechanics, operator-algebra, dynamical-systems, and PDE families are included, together with selected related families. The outer boundary is an editorial choice, not an official IAMP classification.

Ordering. Within each subject, principal results and result families are ordered by apparent potential impact or surprise. Companion manuscripts remain adjacent. This is not a ranking of proof reliability or an assertion of priority.

How to read the summaries. Each entry reports what its manuscript claims. Verbs such as “proves” or “establishes” summarize the manuscript; they do not indicate an independent mathematical verification.

Lean status

- | | |
|----------|---|
| L | Main statement documented (86 papers). The repository's Lean scope notes include the principal result or its central selected statement; not necessarily every corollary. |
| P | Partial or narrower scope (32 papers). A supporting theorem, special regime, conditional version, or weaker conclusion is listed, rather than the headline claim in full. |
| N | Not individually listed (169 papers). No paper-specific Lean statement is named in the checked scope notes. This is not a finding that no formal work exists or that the claim is false. |

Verification boundary. This catalogue was compiled from the repository's manuscript map, overview, and Lean scope notes. Full analytic proofs, finite verifiers, and Lean builds were not independently audited. A family-level Lean label must not be read as certifying all papers in that family.

Source repository: github.com/openai/math. The main branch can change after this snapshot.

Prepared at the request of Hal Tasaki, who specified the scope and presentation.

The selection, summaries, ordering, and Lean-status assessments were generated by ChatGPT Astra.

An independent AI-generated guide, not an official publication of OpenAI or IAMP.

Errors or omissions may remain. Consult the linked sources for current statements and formalization details.

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SECTION 01 / 20 MANUSCRIPTS

Quantum many-body systems, gases, and Coulomb matter

Spectral gaps, entanglement, condensation, magnetism, and atomic structure. Related disorder results are in Section 6; field-theoretic models are in Section 7.

1.01 The periodic spin-one Haldane gap

Family 268 · 24 Sep 2026 · [Preprint page](#)

Claims a size-independent gap for the nearest-neighbor spin-one antiferromagnetic Heisenberg chain on even periodic rings, addressing the original bilinear Haldane problem.

N — No paper-specific Lean statement listed. No Lean scope is listed. A separate Python/NumPy/SciPy finite verifier is supplied; it does not replace the analytic uniform-gap argument.

1.02 A boundary field gap for the spin-one Heisenberg chain

Family 268 · 24 Sep 2026 · [Preprint page](#)

Establishes a uniform gap for odd open spin-one Heisenberg chains with endpoint field $3/5$, and identifies the nontrivial index of the resulting boundary-selected ground states.

N — No paper-specific Lean statement listed.

1.03 A two-dimensional area law from a global spectral gap

Family 265 · 24 Sep 2026 · [Preprint page](#)

Claims an entanglement area law for unique ground states of finite-range, uniformly bounded square-lattice Hamiltonians, using only a uniform global spectral gap.

N — No paper-specific Lean statement listed.

1.04 Polynomial PEPS approximation of gapped square-grid ground states

Family 265 · 24 Sep 2026 · [Preprint page](#)

Derives polynomial-bond-dimension PEPS approximations to gapped square-grid ground states, with global vector error at most the inverse side length.

N — No paper-specific Lean statement listed.

1.05 Bose–Einstein condensation at positive temperature in the dilute hard-sphere gas

Family 267 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims Bose-Einstein condensation in the canonical three-dimensional hard-sphere gas at fixed small density and a strictly positive, volume-independent temperature.

N — No paper-specific Lean statement listed. The family's Lean result concerns ground-state condensation, not positive temperature.

1.06 Ground-state condensation in the dilute hard-sphere gas

Family 267 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves a positive condensate fraction in the dilute three-dimensional hard-sphere ground state, uniformly along thermodynamic sequences, including mixed ground-space states.

L — **Main Lean statement listed.** The uniform positive ground-state condensate fraction is documented; positive-temperature and depletion results are not included.

1.07 Quantum Depletion and Momentum Distribution in the Dilute Hard-sphere Bose Gas

Family 267 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Determines the leading Bogoliubov quantum-depletion law and momentum distribution for hard spheres, taking the thermodynamic limit before the dilute limit.

N — No paper-specific Lean statement listed.

1.08 Quantum Depletion for Fixed Bounded Repulsive Potentials

Family 267 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends leading quantum-depletion asymptotics to fixed bounded repulsive interactions in the dilute Bose gas.

N — No paper-specific Lean statement listed.

1.09 A density-uniform condensate bound for dilute Bose gases

Family 267 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a positive constant-mode condensate fraction for fixed nonzero bounded, nonnegative, radial finite-range interactions in three dimensions, uniformly at sufficiently small densities and temperatures from zero to the density squared. The interaction and density remain fixed in the thermodynamic limit.

N — No paper-specific Lean statement listed.

1.10 A Fock space inequality and the Laughlin spectral gap

Family 269 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims a uniform gap for the spherical filling-one-third Laughlin parent Hamiltonian through a particle-number-uniform Fock-space inequality.

L — Main Lean statement listed. Uniform spherical gap and Fock-space inequalities are documented, with explicit normalizations and constants.

1.11 Uniform Stability of the Spherical Laughlin Gap

Family 269 · 5 Oct 2026 · [Preprint page](#) · [Lean scope](#)

Extends the spherical Laughlin gap to weak bounded scalar disorder after lowest-Landau-level projection, including a perturbed ground-state conclusion.

P — Partial or narrower Lean scope. Only the unperturbed energy bound away from the Laughlin state is documented; disorder stability and perturbed uniqueness are not.

1.12 Spontaneous magnetization in the quantum Heisenberg ferromagnet

Family 271 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims positive-temperature spontaneous magnetization for the quantum Heisenberg ferromagnet in every dimension at least three and every positive spin.

L — Main Lean statement listed. Low-temperature translation-invariant zero-field KMS states with magnetization at least $S/4$ are documented.

1.13 Bloch's Law for Finite-range Heisenberg Ferromagnets in Three Dimensions

Family 271 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Derives the leading temperature-to-the-three-halves magnetization loss, including its coefficient, for generating finite-range nonnegative ferromagnetic couplings.

N — No paper-specific Lean statement listed.

1.14 The first lattice correction to Bloch's law

Family 271 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Determines the temperature-to-the-five-halves correction to spontaneous magnetization in the three-dimensional nearest-neighbor quantum Heisenberg ferromagnet, beyond the leading Bloch term.

N — No paper-specific Lean statement listed.

1.15 The spherical magnetization law for the three-dimensional quantum Heisenberg ferromagnet

Family 271 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

At fixed low positive temperature, claims moment convergence of zero-field magnetization on periodic cubes to a uniformly oriented vector of deterministic positive magnitude, equal to the spontaneous magnetization.

N — No paper-specific Lean statement listed.

1.16 Uniform excess charge for Coulomb molecules and the outer radius of neutral atoms

Family 263 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims uniform excess-charge bounds for binding Coulomb molecules and universal outer-electron and ionization control for neutral atoms, without replacing the full many-electron problem by a mean-field model.

N — No paper-specific Lean statement listed.

1.17 Generalized ionization energies for full Coulomb atoms

Family 263 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Obtains Thomas-Fermi leading asymptotics for removing many electrons from full Coulomb atoms in a regime with the nuclear charge much larger than the removed charge.

L — Main Lean statement listed. The large- m , large- Z/m energy asymptotic is documented; fixed- m convergence and existence of ground states are not asserted.

1.18 Generalized outer electron radii of neutral Coulomb atoms

Family 263 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines the Thomas-Fermi asymptotic radius containing all but m electrons of a neutral atom, with nuclear charge tending to infinity before m .

L — Main Lean statement listed. The iterated-limit radius asymptotic is documented, conditional on supplied ground states; their existence is not included.

1.19 A Coulomb Ground-state Density without Kohn–Sham Ensemble Representation

Family 278 · 25 Sep 2026 · [Preprint page](#)

Constructs a three-electron, two-nucleus Coulomb ground-state density with no noninteracting ground-state ensemble representation by the specified class of real spin-independent local potentials.

N — No paper-specific Lean statement listed.

1.20 A counterexample to the Monge ansatz for the three marginal Coulomb cost

Family 373 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a smooth density whose optimal three-particle Coulomb transport cannot be induced by maps, despite equality of the Monge and Kantorovich infima.

L — Main Lean statement listed. The three-dimensional Coulomb nonattainment theorem is documented; the broader inverse-power extensions are not.

SECTION 02 / 18 MANUSCRIPTS

Classical spin models, continuum phases, and crystallization

Mass generation, BKT behavior, continuum transitions, and particle-energy minimization. Critical Ising, FK, and height-field scaling limits appear in Section 4.

2.01 Exponential decay in two-dimensional classical $O(n)$ models

Family 215 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims exponential spin-correlation decay for every finite inverse temperature in the two-dimensional $O(N)$ model, N at least three, uniformly for bounded ferromagnetic edge couplings.

L — Main Lean statement listed. The uniform finite-subgraph, free-boundary two-point bound is documented. Infinite-volume passage is not part of that selected statement.

2.02 The canonical massive continuum limit of the two-dimensional $O(3)$ model

Family 215 · 4 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a canonical non-Gaussian massive continuum limit of the two-dimensional $O(3)$ model, with locality, a unique vacuum, and relativistic field-theory structure.

N — No paper-specific Lean statement listed. The family's Lean result is the lattice spin-correlation bound, not construction of the continuum theory.

2.03 An isolated particle pole for the two-dimensional $O(3)$ spin field

Family 215 · 4 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims an isolated one-particle pole in the continuum $O(3)$ spin-field spectrum, sharpening mass generation to a particle statement.

N — No paper-specific Lean statement listed. No paper-specific Lean coverage of the particle pole is listed.

2.04 Exact mass asymptotics for the two-dimensional $O(4)$ lattice model

Family 215 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Determines the low-temperature lattice mass asymptotic, including its prefactor, for $O(4)$; this is stronger than a nonzero correlation-decay rate.

N — No paper-specific Lean statement listed.

2.05 Sharp mass bounds for the two-dimensional $O(4)$ model

Family 215 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims sharp low-temperature mass estimates and transfer-gap control for the two-dimensional $O(4)$ model.

N — No paper-specific Lean statement listed. The documented $O(N)$ spin bound does not formalize this paper's transfer-gap conclusion.

2.06 The critical logarithmic correction for the planar XY model

Family 216 · 5 Oct 2026 · [Preprint page](#)

Claims the precise critical spin-correlation form $A r^{-1/4} (\log r)^{1/8}$ for the planar cosine XY model.

N — No paper-specific Lean statement listed.

2.07 Essential Singularity of the Correlation Length in the Planar XY Model

Family 216 · 5 Oct 2026 · [Preprint page](#)

Claims the BKT essential singularity: the logarithm of the correlation length diverges as the inverse square root of the distance to criticality.

N — No paper-specific Lean statement listed.

2.08 The critical correlation exponent of the planar XY model

Family 216 · 24 Sep 2026 · [Preprint page](#)

Identifies the critical spin-correlation exponent as one quarter for the standard planar XY model.

N — No paper-specific Lean statement listed.

2.09 BKT universality for height and planar spin fields

Family 216 · 24 Sep 2026 · [Preprint page](#)

Treats BKT universality for height and planar-spin systems, including the rough-phase endpoint of discrete Gaussian heights under the stated symmetry and limiting conventions.

N — No paper-specific Lean statement listed.

2.10 The Critical Spin Field of the Planar XY Model

Family 216 · 5 Oct 2026 · [Preprint page](#)

Using companion height and pin-limit inputs, claims full-sequence convergence of the critical XY spin field to an imaginary exponential of a zero-Dirichlet GFF with stiffness $2/\pi$.

N — No paper-specific Lean statement listed.

2.11 Critical Center Magnetization in the Planar XY Model

Family 216 · 5 Oct 2026 · [Preprint page](#)

Under the stated companion inputs, obtains aligned-boundary center magnetization of order $n^{(-1/8)}(\log n)^{(1/16)}$, with a positive model-specific amplitude.

N — No paper-specific Lean statement listed.

2.12 An atomic certificate for triangular lattice universal optimality

Family 090 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs sharp Fourier minorants proving that the triangular lattice minimizes planar energy for every nonnegative completely monotone potential of squared distance.

L — Main Lean statement listed. Universal energy minimality and atomic Gaussian-minorant certificates are documented.

2.13 Universal optimality of the triangular lattice

Family 090 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims universal optimality of the density-one triangular lattice among arbitrary locally finite planar configurations, not only among lattices.

N — No paper-specific Lean statement listed. This manuscript is not named in the scope list; the same energy-minimality conclusion is documented under the atomic-certificate companion.

2.14 Triangular minimality for planar Coulomb renormalized energy

Family 090 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims triangular-lattice minimization of renormalized Coulomb energy and related long-range Riesz energies, with consequences for optimal spherical logarithmic energy.

N — No paper-specific Lean statement listed.

2.15 A sharp Fourier certificate for planar circle packing

Family 090 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a sharp planar two-point Fourier packing certificate attaining the triangular-lattice circle-packing density.

L — Main Lean statement listed. The radial Schwartz certificate is documented; separate uniqueness of periodic equality configurations is not.

2.16 A continuum temperature singularity for a radial pair potential

Family 228 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a stable radial three-dimensional pair potential with a genuine canonical temperature singularity at a common inverse temperature over an open density interval.

L — Main Lean statement listed. The canonical limit and strict one-sided derivative jump are documented for the constructed divergent-core potential.

2.17 A radial continuum phase transition with algebraic decay

Family 228 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Produces a continuum transition using a bounded continuous stable radial interaction with an integrable algebraic tail, again over an open density interval.

L — Main Lean statement listed. Existence of the free energy and the common derivative jump are documented for the constructed potential.

2.18 A translational tile with no fully periodic tiling in dimension three

Family 155 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a finite translational tile of the three-dimensional lattice that tiles but never periodically; its thickening gives a continuum example relevant to aperiodic order.

L — Main Lean statement listed. The lattice and continuum counterexamples, including minimal lattice dimension three, are documented.

SECTION 03 / 27 MANUSCRIPTS

Spin glasses, inference, and stochastic equilibration

Free energies, critical dynamics, reconstruction, random constraints, and related mixing methods. The QAOA entries are placed here because their main target is the SK ground-state energy.

3.01 The low-temperature Sherrington–Kirkpatrick free energy limiting law

Family 217 · 24 Sep 2026 · [Preprint page](#)

Claims a full-sequence, nondegenerate limiting law for centered and normalized SK free-energy fluctuations at every fixed inverse temperature greater than one.

N — No paper-specific Lean statement listed.

3.02 The low-temperature Sherrington–Kirkpatrick fluctuation scale

Family 217 · 24 Sep 2026 · [Preprint page](#)

Identifies the low-temperature variance of $\log Z$ at order $n^{1/3}$, giving fluctuation size $n^{1/6}$.

N — No paper-specific Lean statement listed.

3.03 The Mézard–Parisi formula for diluted spin glasses

Family 221 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the full hierarchical cavity variational formula for diluted even-arity Ising models in the Panchenko-Talagrand positivity class, including relevant diluted spin-glass examples.

L — Main Lean statement listed. The limiting-pressure equality is documented under the stated factorization, integrability, independence, and positivity hypotheses.

3.04 QAOA attains the SK ground-state energy in the thermodynamic first limit

Family 281 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that QAOA reaches the SK ground-state energy when system size tends to infinity before circuit depth, using angles independent of the size and disorder.

P — Partial or narrower Lean scope. Only conditional Parisi/diffusion identities and Gaussian-sum approximations are documented; no QAOA energy-convergence theorem is included.

3.05 Full support of the zero-temperature Sherrington–Kirkpatrick order parameter

Family 281 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Establishes full relative support of the zero-temperature SK order parameter on the interval below one.

L — Main Lean statement listed. Full support is documented for every admissible integrable minimizer; existence of a minimizer is not part of the statement.

3.06 All-temperature pressure for orthogonally invariant Ising spin glasses

Family 234 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Gives an all-temperature variational pressure and a zero-temperature limit for Haar-eigenvector Ising couplings with controlled limiting spectra.

L — Main Lean statement listed. Pressure and ground-state limits, including stated field and random-spectrum versions, are documented.

3.07 Microscopic jamming in the negative spherical perceptron

Family 222 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims microscopic gap and force laws near jamming in the negative-margin spherical perceptron, with system size, zero temperature, and critical density taken in the stated order.

N — No paper-specific Lean statement listed.

3.08 The free energy of the Ising random perceptron

Family 222 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the finite-temperature pressure formula for Gaussian Ising perceptrons at arbitrary pattern density, including bounded Borel log-potentials.

P — Partial or narrower Lean scope. Only finiteness of the variational value for bounded continuous log-potentials is documented; pressure convergence is not.

3.09 The free energy of the spherical random perceptron

Family 222 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines the spherical Gaussian perceptron's limiting pressure for all positive pattern densities and temperatures and bounded continuous potentials.

L — Main Lean statement listed. The pressure formula, finiteness, and convergence in expectation and probability are documented.

3.10 The spherical perceptron with bi orthogonally invariant disorder

Family 222 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends spherical-perceptron free-energy analysis to bi-orthogonally invariant disorder with controlled compact singular-value laws and no outliers.

N — No paper-specific Lean statement listed.

3.11 Critical mixing in the Sherrington–Kirkpatrick model

Family 227 · 25 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims the critical SK mixing scale $n^{(2/3+o(1))}$ for continuous-time heat-bath dynamics with rate one per site.

N — No paper-specific Lean statement listed. The family scope lists earlier critical lower/subexponential-upper bounds, not this sharp critical mixing theorem.

3.12 A spectral gap throughout the high-temperature Sherrington–Kirkpatrick phase

Family 227 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves a disorder-typical, dimension-independent heat-bath spectral gap throughout the high-temperature SK phase, inverse temperature below one.

L — Main Lean statement listed. The Poincare inequality and the appropriately rescaled discrete-time gap are documented.

3.13 Cutoff throughout the high-temperature Sherrington–Kirkpatrick phase

Family 227 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims worst-start cutoff throughout the high-temperature SK phase, with continuous-time mixing of logarithmic order.

P — Partial or narrower Lean scope. Only discrete-time ratio cutoff for inverse temperature below one half is documented; the full range and location are not.

3.14 Critical slowing down in the Sherrington–Kirkpatrick model

Family 227 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Studies critical heat-bath slowing down, including covariance growth and polynomial lower bounds on mixing.

P — Partial or narrower Lean scope. Critical $n^{2/3}$ lower and subexponential upper mixing bounds are documented; covariance control is not a full inverse-gap upper bound.

3.15 Stretched exponential barriers for typical SK initial states

Family 227 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Shows that typical realized equilibrium configurations remain far from equilibrium for stretched-exponential times under low-temperature SK Glauber dynamics.

L — Main Lean statement listed. The typical-start obstruction at $\exp(n^{1/10000})$ is documented for every fixed inverse temperature above one.

3.16 A typical start upper bound for low-temperature SK Glauber dynamics

Family 227 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Supplies an upper bound on low-temperature Glauber equilibration from typical SK initial configurations, complementing barrier estimates.

N — No paper-specific Lean statement listed.

3.17 Universality of critical quench autocorrelations in the Sherrington–Kirkpatrick model

Family 227 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies universality of critical SK autocorrelations after a quench, including relaxation toward the stationary critical process.

N — No paper-specific Lean statement listed.

3.18 Functional universality of critical SK autocorrelations

Family 227 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims process-level universality of critical SK autocorrelations, including Gaussian and Rademacher disorder.

N — No paper-specific Lean statement listed.

3.19 The Reconstruction Threshold for the Ferromagnetic Four State Potts Model

Family 229 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims the exact Kesten-Stigum reconstruction threshold for the ferromagnetic four-state Potts broadcast model, including non-reconstruction at equality.

N — No paper-specific Lean statement listed.

3.20 A Capacity Criterion for Four State Potts Reconstruction on Trees

Family 229 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops a tree-capacity characterization of four-state Potts reconstruction, extending the regular-tree threshold viewpoint.

N — No paper-specific Lean statement listed.

3.21 The exact reconstruction threshold for the three state symmetric channel

Family 229 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the exact three-state symmetric-channel threshold on regular and observed Poisson trees, with consequences for three-community inference.

P — Partial or narrower Lean scope. Only reconstruction strictly above the Kesten-Stigum threshold is documented; non-reconstruction and block-model consequences are not.

3.22 A Limiting Satisfiability Threshold for Every Fixed Clause Size

Family 235 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Gives a limiting random k -SAT satisfiability threshold for every fixed k at least three. The repository credits Gaia Carenini with another proof; this should not be read as a sole-priority claim.

L — Main Lean statement listed. Existence of the positive finite threshold is documented; no claim is made at the threshold itself.

3.23 Computing the Random 3 SAT Threshold

Family 235 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves that the limiting random 3-SAT threshold is a computable real, without assuming a computable finite-size convergence rate.

L — Main Lean statement listed. A machine producing rational approximations to any requested accuracy is documented.

3.24 Linear Variance of the Random 3 SAT Hitting Time

Family 235 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Sharpens the variance of the first unsatisfiable prefix length in random 3-SAT to linear order.

N — No paper-specific Lean statement listed. The older formalized variance statement gives only a linear lower bound and an $n \log n$ upper bound for $k=3$.

3.25 Variance of the Random k SAT Hitting Time

Family 235 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Studies fluctuations of the first unsatisfiable prefix: linear variance for fixed k at least four, and near-linear bounds for $k=3$.

L — Main Lean statement listed. Linear order for k at least four and the weaker $k=3$ bounds are documented; the later sharp 3-SAT result is separate.

3.26 The sharp factor of IID threshold for the free Ising model on regular trees

Family 236 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines exactly when the free Ising law on a regular tree can be generated equivariantly from independent vertex labels, including the threshold case.

L — Main Lean statement listed. The equivalence $\tanh(\beta)$ at most $1/\sqrt{d-1}$ is documented; finitary coding and coding radii are not.

3.27 A dimension free logarithmic Sobolev inequality for subgaussian log concave measures

Family 093 · 23 Sep 2026 · [Preprint page](#)

Claims a dimension-free logarithmic Sobolev bound for centered log-concave measures with uniformly subgaussian linear marginals, relevant to concentration and relaxation estimates.

N — No paper-specific Lean statement listed.

SECTION 04 / 43 MANUSCRIPTS

Critical planar models, interfaces, and random geometry

Conformal limits, SLE/CLE, Gaussian free fields, planar maps, and self-avoiding walks. Entries in a multi-paper program remain separate, even when their techniques overlap.

4.01 Conformal Limits of Critical Square Lattice Random Cluster Interfaces

Family 223 · 5 Oct 2026 · [Preprint page](#)

Claims conformally invariant interface limits for critical square-lattice random-cluster models across the continuous-transition range, linked to SLE parameters determined by q .

N — No paper-specific Lean statement listed.

4.02 Square-lattice FK interfaces and nested loops for $1 \leq q < 4$

Family 223 · 23 Sep 2026 · [Preprint page](#)

Claims SLE interface and nested CLE loop limits for square-lattice FK models with $1 \leq q < 4$.

N — No paper-specific Lean statement listed.

4.03 Self dual random cluster interfaces below one

Family 223 · 23 Sep 2026 · [Preprint page](#)

Claims SLE limits for self-dual square-lattice random-cluster interfaces with q below one, where positive-association arguments are unavailable.

N — No paper-specific Lean statement listed.

4.04 Thermal FK Ising interfaces and massive SLE

Family 223 · 5 Oct 2026 · [Preprint page](#)

Treats the off-critical thermal scaling of FK-Ising interfaces and its massive-SLE description.

N — No paper-specific Lean statement listed.

4.05 Natural Occupation Measures for Critical Square Lattice FK Interfaces

Family 223 · 5 Oct 2026 · [Preprint page](#)

Studies natural occupation measures of critical FK interfaces, going beyond convergence of unparametrized curves.

N — No paper-specific Lean statement listed.

4.06 Quenched SLE Universality for Weakly Disordered FK Ising Interfaces

Family 223 · 5 Oct 2026 · [Preprint page](#)

Claims quenched SLE universality for FK-Ising interfaces under weak disorder.

N — No paper-specific Lean statement listed.

4.07 Mass and covering exponents for fixed-length honeycomb walks

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims the three-quarter spatial exponent and four-thirds mass/covering behavior for fixed-length honeycomb self-avoiding walks, with high-probability scale control.

N — No paper-specific Lean statement listed.

4.08 Renewal and changes of law for critical honeycomb walks

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Relates critical walk ensembles by renewal and changes of law, leading to small-force, correlation-length, and three-quarter spatial/moment laws.

P — Partial or narrower Lean scope. Only existence of the infinite-length force-dependent free-energy limit is documented; the exponent conclusions are not.

4.09 Critical strip crossing mass on the honeycomb lattice

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines critical strip-crossing mass and return-displacement moments, central inputs to the honeycomb self-avoiding-walk exponent program.

L — Main Lean statement listed. Strip mass of order $N^{-1/4}$, return moment of order $N^{3/4}$, and supporting balance identities are documented.

4.10 Radial transfer estimates and polygon length laws for honeycomb walks

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops radial transfer bounds and polygon-length estimates for critical honeycomb walks.

N — No paper-specific Lean statement listed.

4.11 Critical honeycomb chords with prescribed boundary endpoints

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Controls critical honeycomb chord ensembles with fixed boundary endpoints, a geometry-specific ingredient of the walk scaling program.

N — No paper-specific Lean statement listed.

4.12 Cylinder loop weights and planar nesting

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Connects cylinder loop weights to planar nesting estimates in the critical honeycomb walk/polygon analysis.

N — No paper-specific Lean statement listed.

4.13 Signed cylinder propagation and marked polygons on the honeycomb lattice

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Uses signed propagation on cylinders to estimate marked honeycomb polygons.

N — No paper-specific Lean statement listed.

4.14 Cylinder amplitudes and logarithmic bridge length windows on the honeycomb lattice

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Analyzes cylinder amplitudes and bridge-length concentration in logarithmic windows.

N — No paper-specific Lean statement listed.

4.15 Marked polygon correlations and one arc bounds

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops marked-polygon correlation estimates and one-arc bounds used to control critical walk geometry.

N — No paper-specific Lean statement listed.

4.16 Disk transfer representations and confined bridge mass

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Builds disk transfer representations and bounds bridge mass under confinement.

N — No paper-specific Lean statement listed.

4.17 Polynomial vacuum representations and bridge mass for honeycomb walks

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Uses polynomial vacuum representations to study bridge measures, mean lengths, and geometric visitation exponents.

P — Partial or narrower Lean scope. Only finiteness of critical bridge mass and first length moments is documented; the four-thirds mean-length and other exponents are not.

4.18 Uniform marked polygon estimates and sharp finite bridge moments

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Provides uniform marked-polygon estimates and sharp finite-bridge moment bounds.

N — No paper-specific Lean statement listed.

4.19 Cap selected amplitudes and triangle chords for honeycomb walks

Family 237 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies cap-selected amplitudes and chord estimates in triangular domains for honeycomb walks.

N — No paper-specific Lean statement listed.

4.20 Conformal universality of bulk Ising correlations under weak interactions

Family 218 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims universality of critical bulk spin and energy correlations under weak finite-range, square-symmetric even-spin interactions.

N — No paper-specific Lean statement listed.

4.21 SLE(3) universality for weak finite-range Ising interactions

Family 218 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims SLE(3) scaling limits of critical Ising contours under weak finite-range interactions.

N — No paper-specific Lean statement listed.

4.22 Quenched SLE(3) limits for general weak random-bond Ising models

Family 218 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends quenched critical-interface universality to general weak random-bond Ising perturbations.

N — No paper-specific Lean statement listed.

4.23 Quenched SLE(3) universality for the weak random-bond Ising model

Family 218 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims quenched SLE(3) interface limits for weak bounded independent mean-zero bond disorder.

N — No paper-specific Lean statement listed.

4.24 Logarithmic Relative Fluctuations in the Weakly Disordered Planar Ising Model

Family 218 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Analyzes logarithmic relative fluctuations in weakly disordered critical planar Ising correlations.

N — No paper-specific Lean statement listed.

4.25 Buffered comparison and stopping band resolution in critical Ising

Family 218 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops buffered comparison and stopping-band approximations supporting critical Ising universality arguments.

P — Partial or narrower Lean scope. Only a finite-graph likelihood-ratio comparison controlled by an FK connection probability is documented; stopping-band resolution is not.

4.26 The critical Liouville quantum sphere and geometric limits of FK maps at q equals 4

Family 211 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims critical Liouville-quantum-sphere geometry for finite FK planar maps at $q=4$, the boundary between subcritical quantum geometry and tree-like behavior.

N — No paper-specific Lean statement listed.

4.27 Canonical conformal limits of subcritical FK planar maps

Family 211 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Constructs canonical conformal scaling limits for subcritical FK-weighted planar maps in the Liouville-quantum-gravity regime.

N — No paper-specific Lean statement listed.

4.28 Metric measure limits of subcritical FK and spanning tree planar maps

Family 211 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies metric-measure convergence of FK and spanning-tree-weighted maps to their continuum random geometries.

N — No paper-specific Lean statement listed.

4.29 Brownian continuum random tree limits of finite Fortuin Kasteleyn maps above four

Family 211 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims a Brownian continuum-random-tree limit for critical finite FK maps whenever q exceeds four, along all integer sizes.

L — Main Lean statement listed. Gromov-Hausdorff-Prokhorov convergence with distances rescaled by $n^{(-1/2)}$ and degree measure is documented.

4.30 Random Walks on Critical FK Ising Maps and Liouville Brownian Motion

Family 211 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies random walks on critical FK-Ising maps and their Liouville Brownian-motion limits under the stated continuum inputs.

N — No paper-specific Lean statement listed.

4.31 Spectral convergence for critical FK Ising planar maps

Family 211 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops spectral convergence for FK-Ising random maps, including eigenvalue and heat-trace consequences under the stated geometric inputs.

N — No paper-specific Lean statement listed.

4.32 A Linear Clock for Random Walk on Tree Weighted Planar Maps

Family 211 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Identifies a linear time normalization for random walk on spanning-tree-weighted maps in its continuum diffusion limit.

N — No paper-specific Lean statement listed.

4.33 The Gaussian free-field limit of the balanced six-vertex model with variance multiplier $1/\arcsin(c/2)$

Family 225 · 23 Sep 2026 · [Preprint page](#)

Claims a GFF limit for balanced six-vertex heights with $a=b=1$ and $0 < c \leq 2$, including the endpoint, with variance multiplier $1/\arcsin(c/2)$.

N — No paper-specific Lean statement listed.

4.34 The joint scaling limit of critical Ashkin Teller currents

Family 233 · 25 Sep 2026 · [Preprint page](#)

Claims a joint height/current-cluster scaling limit along the entire critical Ashkin-Teller line, including four-state Potts, using canonical sets of a common GFF.

N — No paper-specific Lean statement listed.

4.35 Cardy's formula for critical Poisson Voronoi percolation

Family 224 · 23 Sep 2026 · [Preprint page](#)

Claims Cardy's formula for annealed critical Poisson-Voronoi crossing probabilities in general Jordan quadrilaterals.

N — No paper-specific Lean statement listed.

4.36 From critical crossings to quenched near critical universality in Voronoi percolation

Family 224 · 5 Oct 2026 · [Preprint page](#)

Derives quenched near-critical universality from critical crossings, with model-specific pivotal normalization and comparison to the triangular-lattice reference.

N — No paper-specific Lean statement listed.

4.37 A Pivotal Amplitude for Voronoi Percolation from Cardy's Formula

Family 224 · 5 Oct 2026 · [Preprint page](#)

Extracts a pivotal normalization amplitude from Cardy's formula, supplying quantitative input to near-critical Voronoi scaling.

N — No paper-specific Lean statement listed.

4.38 The curve scaling limit of half plane double dimers

Family 226 · 23 Sep 2026 · [Preprint page](#)

Claims convergence of the full nested collection of macroscopic half-plane double-dimer loops to $CLE(4)$, as unparametrized curves.

N — No paper-specific Lean statement listed.

4.39 Gaussian free field limits of weighted integer Lipschitz heights

Family 232 · 25 Sep 2026 · [Preprint page](#)

Claims GFF limits for weighted integer Lipschitz heights on triangular-lattice domains throughout the specified weight interval, with zero boundary values.

N — No paper-specific Lean statement listed.

4.40 The Gaussian free field limit of integer Lipschitz heights with two arc boundary data

Family 232 · 25 Sep 2026 · [Preprint page](#)

Treats integer Lipschitz height fields with two-arc boundary data, extending the zero-boundary scaling limit.

N — No paper-specific Lean statement listed.

4.41 Uniform real Lipschitz surfaces on the triangular lattice

Family 232 · 25 Sep 2026 · [Preprint page](#)

Studies GFF limits of uniform real-valued Lipschitz surfaces and SLE(4) interfaces under tuned boundary conditions.

N — No paper-specific Lean statement listed.

4.42 An explicit exact Hausdorff gauge for SLE

Family 230 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims an explicit exact Hausdorff gauge $r^d (\log \log(1/r))^{((2-d)/2)}$ for SLE with $0 < \kappa < 8$ and $d = 1 + \kappa/8$.

P — Partial or narrower Lean scope. Positivity on every nontrivial positive-time segment is documented; finiteness of the gauge measure is not included.

4.43 An exact Hausdorff gauge for SLE

Family 230 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops a moment-integral and finite-batch construction of an exact Hausdorff gauge for SLE traces.

P — Partial or narrower Lean scope. The linked selected theorem establishes lower positivity for the explicit gauge, not the full positive-and-finite assertion.

SECTION 05 / 9 MANUSCRIPTS

Percolation and transport in random media

Critical clusters, nonuniqueness phases, first-passage geometry, random environments, and equivariant sampling.

5.01 Critical bond and site percolation on the cubic lattice

Family 213 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that neither bond nor site percolation on the cubic lattice has an infinite cluster at its critical parameter.

L — Main Lean statement listed. Absence of all infinite clusters at the respective critical probabilities is documented for both models.

5.02 No percolation at criticality on quasi transitive graphs

Family 213 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Extends absence of critical percolation to infinite connected locally finite quasi-transitive graphs with critical probability below one.

L — Main Lean statement listed. The general Bernoulli bond-percolation statement is documented, including the stated graph multiplicities.

5.03 Nonuniqueness of percolation on nonamenable quasi transitive graphs

Family 214 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims a nonempty nonuniqueness phase on every nonamenable quasi-transitive graph, together with critical triangle and mean-field-type estimates.

L — Main Lean statement listed. The inequality $p_c < p_{(2\text{-to-}2)} \leq p_u$, infinitely many clusters in the intervening phase, and selected critical laws are documented.

5.04 No bigeodesics in planar first passage percolation

Family 212 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims absence of doubly infinite geodesics in planar first-passage percolation with independent nonatomic nonnegative weights satisfying the stated moment condition.

N — No paper-specific Lean statement listed.

5.05 Strict convexity and differentiability of the planar exponential first passage limit shape

Family 212 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims strict convexity and a continuously differentiable boundary for the exponential first-passage limit shape, with Gamma-weight differentiability extensions.

P — Partial or narrower Lean scope. Differentiability for all positive Gamma shape/rate parameters is documented; strict convexity is not.

5.06 Directional transience implies ballisticity

Family 220 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that directional transience implies positive deterministic speed in that direction for uniformly elliptic independent random environments in dimension at least two.

L — Main Lean statement listed. The ballisticity implication is documented, with a stronger positive-probability/velocity-hemisphere statement in dimensions at least three.

5.07 A directional zero one law under strict ellipticity

Family 220 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves a directional zero-one law for independent nearest-neighbor random environments in dimension at least three under strict, not uniform, ellipticity.

L — Main Lean statement listed. The annealed law in every nonzero direction is documented without an additional moment hypothesis.

5.08 A directional zero one law for finite-range dependent random environments

Family 220 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends directional zero-one laws to stationary ergodic finite-range-dependent environments under uniform ellipticity.

N — No paper-specific Lean statement listed.

5.09 The free uniform spanning forest is a factor of IID

Family 231 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs root-free equivariant sampling of the free uniform spanning forest from independent labels on every infinite locally finite connected simple graph.

L — Main Lean statement listed. The universal forest factor and specified strongly Rayleigh/determinantal sampling extensions are documented.

SECTION 06 / 15 MANUSCRIPTS

Spectral theory, random operators, and eigenfunctions

Localization versus delocalization, spectral inequalities, random-matrix universality, nodal geometry, and nonnormal functional calculus.

6.01 Absolutely Continuous Spectrum for Weak Disorder Anderson Models in Dimensions at Least Three

Family 261 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a nonempty open interval of purely absolutely continuous spectrum for weak independent uniform Anderson disorder in every dimension at least three.

N — No paper-specific Lean statement listed. No paper-specific Lean delocalization result is listed.

6.02 Pure Point Spectrum for the Two-dimensional Anderson Model at Every Positive Disorder

Family 261 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims pure-point spectrum for the two-dimensional Anderson model at every positive disorder strength.

P — Partial or narrower Lean scope. Only bounded self-adjoint construction and the almost-sure spectral set $[-4-h, 4+h]$ are documented. Pure-point spectral type is not proved by that selected theorem.

6.03 Sharp One-dimensional Lieb–Thirring Constants

Family 262 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the sharp one-dimensional scalar Lieb–Thirring constant throughout the intermediate exponent range $1/2 < \gamma < 3/2$, realized by a one-bound-state soliton potential.

L — Main Lean statement listed. The full negative-eigenvalue moment inequality and optimal constant are documented; no finite spectral cutoff is imposed.

6.04 Sharp one-dimensional Lieb–Thirring inequalities for matrix potentials

Family 262 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends the sharp intermediate-exponent inequality to matrix potentials with the scalar constant, independent of matrix size.

N — No paper-specific Lean statement listed.

6.05 Equality cases in the sharp one-dimensional matrix Lieb–Thirring inequality

Family 262 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Classifies equality cases in the sharp matrix inequality as direct-sum soliton structures.

N — No paper-specific Lean statement listed.

6.06 GOE bulk universality for fixed degree random regular graphs

Family 219 · 23 Sep 2026 · [Preprint page](#)

Claims GOE bulk statistics for random regular graphs of every fixed degree at least three, including cubic graphs.

N — No paper-specific Lean statement listed.

6.07 Fixed energy universality for weak Anderson disorder on random regular graphs

Family 219 · 5 Oct 2026 · [Preprint page](#)

Claims fixed-energy bulk universality for weak fixed-strength diagonal disorder on random regular graphs, away from the clean spectral edges.

N — No paper-specific Lean statement listed.

6.08 Smooth counterexamples to Yau's nodal upper bound in dimensions three and four

Family 350 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs fixed smooth metrics with eigenfunction nodal measure exceeding every constant multiple of the square root of the eigenvalue, including metrics near round S^3 .

L — Main Lean statement listed. The fixed-metric three- and four-dimensional counterexamples and unbounded nodal ratios are documented.

6.09 Power law violations of Yau's nodal upper bound

Family 350 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims a power-law violation of the proposed nodal upper bound on a fixed five-dimensional manifold.

P — Partial or narrower Lean scope. An unbounded nodal-measure/sqrt(eigenvalue) ratio on $S^4 \times S^1$ is documented; the stronger power-law rate is not.

6.10 Sharp nodal length on smooth surfaces

Family 350 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the sharp square-root eigenvalue scale for nodal length on every fixed smooth closed surface.

L — Main Lean statement listed. The new upper bound is documented; the known matching lower bound is not a separate selected statement.

6.11 Strict hot spots and absence of interior critical points on smooth simply connected planar domains

Family 369 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that every nonzero first positive Neumann eigenfunction on a smooth bounded simply connected planar domain has no interior critical point.

L — Main Lean statement listed. Nonvanishing interior gradient and boundary-only extrema are documented, also for multiple eigenvalues.

6.12 The complete Crouzeix theorem

Family 325 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the sharp complete Crouzeix bound with constant two for matrix-valued functional calculus of arbitrary bounded operators, together with structural positivity results.

L — Main Lean statement listed. The arbitrary-Hilbert-space polynomial/holomorphic bound and selected optimal-similarity representations are documented.

6.13 A direct proof of the complete Crouzeix inequality

Family 325 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Provides a direct route to the sharp constant-two complete Crouzeix inequality, uniform in matrix and coefficient sizes.

L — Main Lean statement listed. The finite-matrix inequality and sharpness are documented.

6.14 The sharp exponential rate of singularity for symmetric Bernoulli matrices

Family 239 · 3 Oct 2026 · [Preprint page](#)

Claims the sharp exponential singularity probability $(1/2+o(1))^n$ for symmetric Bernoulli matrices.

N — No paper-specific Lean statement listed.

6.15 The sharp singularity rate for biased symmetric sign matrices

Family 239 · 4 Oct 2026 · [Preprint page](#)

Identifies the biased symmetric-sign singularity rate as $(p^2+(1-p)^2+o(1))^n$.

N — No paper-specific Lean statement listed.

SECTION 07 / 14 MANUSCRIPTS

Quantum field theory and its geometric structures

Matrix quantum mechanics, conformal nets, scale symmetry, mirror-symmetry geometry, quiver varieties, Virasoro constraints, and quantum geometric Langlands. The $O(3)$ continuum papers are in Section 2.

7.01 The unique threshold bound state of the $SU(N)$ BFSS model

Family 270 · 24 Sep 2026 · [Preprint page](#)

Claims exactly one normalizable zero-energy state for the undeformed relative $SU(N)$ BFSS model at every finite N at least two.

N — No paper-specific Lean statement listed.

7.02 Positive eigenvalues of the relative $SU(2)$ BFSS Hamiltonian

Family 270 · 5 Oct 2026 · [Preprint page](#)

Claims infinitely many positive-energy eigenstates with unbounded energies in the relative $SU(2)$ BFSS model, contrary to the stated original spectral prediction.

N — No paper-specific Lean statement listed.

7.03 Strongly rational unitary vertex operator algebras and conformal nets

Family 280 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims a bridge from strongly rational unitary vertex operator algebras to conformal nets and their representation-theoretic structure.

P — Partial or narrower Lean scope. Energy bounds, strong locality, and the conformal-net construction are documented; complete rationality and braided representation equivalence are not.

7.04 Scale and conformal symmetry in four dimensional operational quantum field theory

Family 282 · 26 Sep 2026 · [Preprint page](#)

Derives a traceless stress-tensor improvement and local conformal Ward identities under specified operational-net, scaling-spectrum, and scale-current hypotheses; not an unrestricted scale-implies-conformal theorem.

N — No paper-specific Lean statement listed.

7.05 Global quantum geometric Langlands at irrational level

Family 069 · 4 Oct 2026 · [Preprint page](#)

Claims the unramified de Rham quantum geometric Langlands equivalence at every irrational shifted level for connected simple complex groups on smooth projective curves, retaining global forms and components.

N — No paper-specific Lean statement listed.

7.06 A Gepner stability condition on every smooth quintic threefold

Family 055 · 24 Sep 2026 · [Preprint page](#)

Claims a Gepner-type Bridgeland stability condition on every smooth quintic threefold, with the expected fractional shift symmetry.

N — No paper-specific Lean statement listed.

7.07 Prescribed large volume charges on threefolds with trivial canonical bundle

Family 055 · 24 Sep 2026 · [Preprint page](#)

Constructs large-volume stability conditions with prescribed ordinary or Todd-corrected charges on threefolds with trivial canonical bundle.

N — No paper-specific Lean statement listed.

7.08 The Strong Hyperkähler SYZ Conjecture

Family 041 · 23 Sep 2026 · [Preprint page](#)

Claims semiampleness of every nonzero nef isotropic line bundle on a compact irreducible holomorphic symplectic manifold, producing the predicted Lagrangian fibration.

N — No paper-specific Lean statement listed.

7.09 Projective Space Bases of Lagrangian Fibrations

Family 041 · 23 Sep 2026 · [Preprint page](#)

Claims that the normal projective base of the relevant hyperkahler Lagrangian fibration is projective space.

N — No paper-specific Lean statement listed.

7.10 The equivariant cohomological Hikita conjecture for arbitrary quivers

Family 044 · 24 Sep 2026 · [Preprint page](#)

Identifies equivariant cohomology of Nakajima varieties with coordinate rings of fixed Coulomb-branch loci for arbitrary quivers, under the stated stability and free-action hypotheses.

N — No paper-specific Lean statement listed.

7.11 P equals W in composite rank for fixed determinant

Family 043 · 24 Sep 2026 · [Preprint page](#)

Claims the $P=W$ correspondence for full cohomology of coprime fixed-determinant, trace-free Higgs moduli in composite rank, including variant cohomology.

N — No paper-specific Lean statement listed.

7.12 Virasoro Constraints for Projective Complete Intersections

Family 065 · 24 Sep 2026 · [Preprint page](#)

Claims the full ordinary descendant Virasoro constraints for smooth projective complete intersections, in every genus and curve class and with arbitrary insertions.

N — No paper-specific Lean statement listed.

7.13 Virasoro Constraints under Projectivization

Family 065 · 5 Oct 2026 · [Preprint page](#)

Shows that descendant Virasoro constraints pass from a smooth projective base to projectivizations of vector bundles and to iterated projective-bundle towers.

N — No paper-specific Lean statement listed.

7.14 The Deligne Drinfeld conjecture

Family 008 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that the rational Grothendieck-Teichmüller Lie algebra is freely generated in odd weights, relevant to associators and algebraic structures appearing in perturbative field theory.

L — Main Lean statement listed. The Lie-algebra freeness and weight-completed version are documented; graph-complex consequences are not.

SECTION 08 / 13 MANUSCRIPTS

Quantum information and computation

Entanglement, channel capacities, entropy inequalities, games, circuit lower bounds, and continuum Hamiltonian complexity.

8.01 The maximum number of mutually unbiased bases in dimension six

Family 266 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that three is the maximum number of mutually unbiased bases in dimension six, using a separate computer-assisted exclusion of four.

P — Partial or narrower Lean scope. Only an upper bound of five and a Fourier character-sum result are documented in Lean; exclusion of four is not.

8.02 Exact Fourier certificates for complex Hadamard matrices of order six

Family 266 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops Fourier certificates for order-six complex Hadamard matrices, supporting the dimension-six mutually-unbiased-bases analysis.

P — Partial or narrower Lean scope. Only a cube-fiber cancellation lemma under extra Hadamard hypotheses is documented; the full certificate and MUB conclusions are not.

8.03 Entanglement with zero distillable secret key in local dimension ten

Family 272 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims an entangled 10-by-10 state with zero distillable secret key for the specified almost-surely terminating protocol class, and related PPT-square counterexamples.

P — Partial or narrower Lean scope. PPT-channel composition and a dimension-21 square counterexample are documented; the zero-secret-key conclusion is not.

8.04 The entropy photon number inequality

Family 273 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the multimode entropy photon-number inequality for finite-energy independent beam-splitter inputs, allowing entanglement within each input.

L — Main Lean statement listed. The beam-splitter entropy-power statement is documented; broadcast-capacity and minimum-output consequences are not.

8.05 QMA hardness of continuum Coulomb energy with unit nuclear charges

Family 275 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims QMA-hardness of the full spinful continuum Coulomb energy problem with unit nuclear charges, rational positions, and no finite-basis truncation.

L — Main Lean statement listed. The uniform polynomial reduction with the stated promise thresholds is documented.

8.06 Continuum Coulomb hardness with binary nuclear charges

Family 275 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Establishes continuum Coulomb QMA-hardness allowing positive integer nuclear charges in binary, without external fields or a binding premise.

L — Main Lean statement listed. The antisymmetric continuum problem and polynomial reduction are documented.

8.07 Exact quantum factoring over a fixed finite gate set

Family 279 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims probability-one complete integer factorization by polynomial-size, uniformly generated quantum circuits over one fixed finite bounded-arity gate set.

L — Main Lean statement listed. Exact factoring, uniformity, and polynomial gate/qubit bounds are documented.

8.08 Classical capacity and entropy inequalities for generalized amplitude damping

Family 276 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines classical capacity for generalized amplitude-damping channels via an attained scalar optimization and product phase-pair ensembles.

L — Main Lean statement listed. The main capacity and repeated-use additivity statements are documented; additivity with an arbitrary different partner channel is not.

8.09 Threshold parallel repetition for finite-dimensional entangled games

Family 277 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves exponential threshold parallel repetition for finite-dimensional entangled games below value one, allowing correlated questions and unattained optimal value.

L — Main Lean statement listed. The stated bound with a thirteenth-power threshold dependence is documented; a separate stronger cubic bound is not.

8.10 Product projection localization and the QAC0 parity lower bound

Family 274 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that constant-depth polynomial-resource QAC0 circuits cannot compute parity with fixed positive advantage, using product-projection localization.

L — Main Lean statement listed. The measured-output parity obstruction with polynomial zero ancillas and its localization estimate are documented.

8.11 Regular trajectories pruning and quantum parity

Family 274 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops a regular-trajectory and pruning approach to quantum parity lower bounds.

L — Main Lean statement listed. The selected two-thirds-success parity obstruction is documented; the trajectory/pruning method is not independently formalized.

8.12 Polynomial Time Unitary Synthesis from a Boolean Oracle

Family 283 · 5 Oct 2026 · [Preprint page](#)

Claims polynomial-size synthesis of any n -qubit unitary channel to fixed diamond-norm accuracy using a suitably chosen Boolean oracle; efficient classical construction of that oracle is not asserted.

N — No paper-specific Lean statement listed.

8.13 A Nearly Quartic Separation Between Randomized and Quantum Query Complexity

Family 284 · 5 Oct 2026 · [Preprint page](#)

Constructs total Boolean functions approaching the maximal quartic separation between randomized and quantum query complexity.

N — No paper-specific Lean statement listed.

SECTION 09 / 16 MANUSCRIPTS

General relativity and gravitational inequalities

Penrose inequalities, charged and asymptotically hyperbolic variants, and strong cosmic censorship. Companion papers separate distinct hypotheses and rigidity issues.

9.01 The spacetime Penrose inequality and enclosing area

Family 260 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims an enclosing-area spacetime Penrose inequality for one-ended asymptotically flat initial data in all spatial dimensions at least three, under the stated energy, trapping, and decay assumptions.

N — No paper-specific Lean statement listed. The family's documented Lean result is an end-replacement theorem, not this general spacetime inequality.

9.02 The spacetime Penrose inequality with charge and original data rigidity

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Adds electric charge and rigidity formulated for the original initial data to the spacetime Penrose program.

N — No paper-specific Lean statement listed.

9.03 The Kerr Newman Penrose Inequality for Axisymmetric Electrovacuum Exteriors

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims the Kerr-Newman-type Penrose bound for the specified axisymmetric electrovacuum exteriors, incorporating rotational and electromagnetic data.

N — No paper-specific Lean statement listed.

9.04 The nonmaximal anti de Sitter Penrose Inequality and original data rigidity

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Treats nonmaximal asymptotically anti-de Sitter initial data and equality rigidity in the original-data formulation.

N — No paper-specific Lean statement listed.

9.05 The Penrose inequality for maximal asymptotically hyperbolic initial data

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a Penrose inequality for maximal asymptotically hyperbolic initial data.

N — No paper-specific Lean statement listed.

9.06 Equality and rigidity in the spacetime Penrose inequality

Family 260 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Analyzes equality and rigidity in the spacetime Penrose bound under additional stated geometric assumptions.

N — No paper-specific Lean statement listed.

9.07 Spacetime Penrose inequalities enclosing area charge and rigidity

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Organizes enclosing-area, charged, and rigidity forms of spacetime Penrose inequalities.

N — No paper-specific Lean statement listed.

9.08 A Charged Reduction of the Spacetime Penrose Inequality in Spatial Dimensions at Least Four

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops a charged reduction mechanism in spatial dimensions four and higher.

N — No paper-specific Lean statement listed.

9.09 Electromagnetic tails and the Kerr Newman Penrose inequality

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Controls electromagnetic-tail contributions in the Kerr-Newman Penrose analysis.

N — No paper-specific Lean statement listed.

9.10 Conformal flow and the Riemannian Penrose inequality with minimizing frontiers

Family 260 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops conformal-flow arguments for Riemannian Penrose inequalities using minimizing frontiers.

N — No paper-specific Lean statement listed.

9.11 Boundary graph deformations for the spacetime Penrose inequality

Family 260 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Provides boundary-graph deformation constructions supporting the spacetime Penrose reduction.

N — No paper-specific Lean statement listed.

9.12 A local Penrose inequality for conformal perturbations of Schwarzschild anti de Sitter data

Family 260 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Establishes a local Penrose inequality near Schwarzschild-anti-de Sitter data for the stated conformal perturbations.

N — No paper-specific Lean statement listed.

9.13 Area controlled end replacement and the Bondi Penrose inequality in the CKS class

Family 260 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Connects hyperboloidal and asymptotically flat ends while controlling area and mass, toward Bondi-Penrose inequalities in the CKS class.

P — Partial or narrower Lean scope. End replacement, mass/area limits, and a conditional connected-boundary implication are documented; the general Bondi-Penrose inequality is not.

9.14 Generic Future Inextendibility with Square Integrable Connection Near a Fixed Kerr Spacetime

Family 264 · 23 Sep 2026 · [Preprint page](#)

Claims generic future inextendibility near a fixed rotating subextremal Kerr spacetime even among continuous nondegenerate extensions with square-integrable connection, without symmetry reduction.

N — No paper-specific Lean statement listed.

9.15 Generic C1 Future Inextendibility Near Rotating Subextremal Kerr Spacetimes

Family 264 · 23 Sep 2026 · [Preprint page](#)

Claims generic C1 future inextendibility of developments from data near rotating subextremal Kerr, a strong-cosmic-censorship statement.

N — No paper-specific Lean statement listed.

9.16 Quantitative Near Kerr Evolution and Generic C2 Future Inextendibility

Family 264 · 23 Sep 2026 · [Preprint page](#)

Develops quantitative near-Kerr evolution estimates and generic C2 future inextendibility.

N — No paper-specific Lean statement listed.

SECTION 10 / 33 MANUSCRIPTS

Operator algebras and noncommutative structures

The scope here is deliberately broad: von Neumann factors, C^* -algebra classification and perturbation, quasitraces, free entropy, and unitary representation problems.

10.01 An isomorphism of the free group factors

Family 287 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that all interpolated free group factors, including the infinite-parameter factor, are isomorphic, resolving the free group factor isomorphism problem.

L — Main Lean statement listed. Normal trace-preserving isomorphisms for all parameters greater than one are documented; the fundamental-group consequence is not separately stated.

10.02 Expected amenable subalgebras preserving core commutants

Family 290 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims relative bicentralizer results through expected amenable subalgebras preserving continuous-core commutants, including an absolute bicentralizer conclusion.

N — No paper-specific Lean statement listed. The family scope explicitly excludes the absolute bicentralizer conjecture.

10.03 Bounded recovery for modular spectral averages

Family 290 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Converts positive modular spectral averages into uniformly bounded algebra elements in the stated standard representation, supporting bicentralizer analysis.

P — Partial or narrower Lean scope. The bounded-recovery lemma is documented; the absolute bicentralizer conclusion is not.

10.04 A Torsion Free Counterexample to Reduced Baum Connes Injectivity

Family 285 · 23 Sep 2026 · [Preprint page](#)

Claims a torsion-free counterexample to rational injectivity of the coefficient-free reduced Baum-Connes assembly map.

N — No paper-specific Lean statement listed.

10.05 An Irrational Trace Counterexample to Reduced Baum Connes

Family 285 · 23 Sep 2026 · [Preprint page](#)

Constructs an irrational-trace obstruction to reduced Baum-Connes surjectivity.

N — No paper-specific Lean statement listed.

10.06 A Torsion Free Counterexample to the Kadison Kaplansky Projection Conjecture

Family 285 · 23 Sep 2026 · [Preprint page](#)

Claims a torsion-free group whose reduced group C^* -algebra contains a nontrivial projection.

N — No paper-specific Lean statement listed.

10.07 A counterexample to Kaplanskys quasitrace conjecture

Family 294 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs genuinely nonadditive normalized 2-quasitraces and simple stably finite C^* -algebras whose spatial tensor product is properly infinite.

L — Main Lean statement listed. The nonadditivity witness and stable-finiteness/tensor-product consequences are documented.

10.08 Backward intertwiners and a transitive commutant

Family 293 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a nonzero quasinilpotent operator with no nontrivial closed hyperinvariant subspace, via a proper strongly closed transitive commutant.

L — Main Lean statement listed. The quasinilpotent counterexample on every separable infinite-dimensional complex Hilbert space is documented.

10.09 Invariant projection counterexamples for every irrational rotation

Family 293 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs continuous weighted rotations with no nontrivial invariant projection in their associated hyperfinite type-II₁ factor, for every irrational angle.

L — Main Lean statement listed. The invariant-projection counterexamples and selected Brown-measure facts are documented.

10.10 Kadison's similarity theorem through uniform derivation estimates

Family 288 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that every bounded unital homomorphism from a C^* -algebra to Hilbert-space operators is similar to a star-homomorphism.

L — Main Lean statement listed. The similarity theorem and uniform amplified commutator/hyperreflexivity estimates are documented.

10.11 Relative generation and the generator problem for finite factors

Family 296 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims single generation of every separable-predual type-II₁ factor, and generic relative generation for irreducible inclusions.

L — Main Lean statement listed. Both single generation and the dense-G-delta relative-unitary-generator statement are documented.

10.12 A counterexample to Naimark's problem in ZFC

Family 297 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a nonseparable unital simple tracial C^* -algebra with one irreducible representation up to equivalence, but not an algebra of compact operators. The repository also credits an independent Tanaka result.

L — Main Lean statement listed. The ZFC counterexample, without additional set-theoretic assumptions, is documented.

10.13 Cuntz comparison and Jiang Su absorption

Family 291 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops strict-comparison criteria for Jiang-Su absorption, forming part of the claimed resolution of the Toms-Winter regularity conjecture.

N — No paper-specific Lean statement listed. This paper is not individually named in the scope list; related comparison-to-absorption statements appear under the tracial-projection companion.

10.14 Nuclear dimension and Jiang Su stability without elementary subquotients

Family 291 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Relates nuclear dimension and Jiang-Su stability beyond the simple setting, excluding elementary subquotients as specified.

N — No paper-specific Lean statement listed.

10.15 Equivariant Jiang Su Stability for Amenable Actions in the Unital Stably Finite Case

Family 291 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims equivariant Jiang-Su stability for amenable actions on the stated unital stably finite algebras, without restrictions on trace dynamics.

N — No paper-specific Lean statement listed.

10.16 Tracial projection methods and uniform property Gamma

Family 291 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Uses tracial ultrapower projection methods to obtain uniform property Gamma and related regularity consequences.

P — Partial or narrower Lean scope. Conditional real-rank-zero-to-Gamma and specified comparison-to-absorption statements are documented; not the whole multi-paper regularity program.

10.17 The Kirchberg Rordam character criterion

Family 299 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that absence of characters on the norm central-sequence algebra exactly characterizes Jiang-Su absorption for nonzero unital separable C^* -algebras.

L — Main Lean statement listed. The equivalence is documented without nuclearity, simplicity, trace, or comparison assumptions.

10.18 Universal strong Kadison–Kastler stability

Family 289 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that sufficiently close represented von Neumann algebras are conjugate by a near-identity unitary, with universal tolerance.

L — Main Lean statement listed. The uniform near-identity unitary-conjugacy statement is documented for arbitrary Hilbert spaces.

10.19 Near Inclusions of von Neumann Algebras Without Small Spatial Embeddings

Family 289 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Constructs near inclusions showing that one-sided closeness need not yield a small spatial embedding.

N — No paper-specific Lean statement listed.

10.20 Close Separable C^* Algebras Without Spatial Conjugacy

Family 289 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Gives close separable C^* -algebras that are not spatially conjugate, delimiting the von Neumann perturbation theorem.

N — No paper-specific Lean statement listed.

10.21 An explicit obstruction to nuclear norm ultrapower embeddings

Family 292 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs an explicit separable full group C^* -algebra with no unital embedding into a norm ultrapower of any fixed nonzero unital nuclear target, including O_2 .

L — Main Lean statement listed. The universal nuclear-target obstruction is documented.

10.22 A finite entropy separation of microstates and nonmicrostates free entropy

Family 298 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a bounded self-adjoint tuple whose microstates and nonmicrostates free entropies are both finite but different.

L — Main Lean statement listed. A fixed finite tuple with a positive quantitative entropy separation is documented.

10.23 Vanishing of higher bounded Hochschild cohomology

Family 295 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims vanishing of bounded self-coefficient Hochschild cohomology in all degrees at least two for every complex von Neumann algebra.

L — Main Lean statement listed. Bounded primitives for all such cocycles are documented without type or separability restrictions.

10.24 Weak pure infiniteness and O infinity absorption

Family 303 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Relates individual and strong pure infiniteness, including a fixed-amplification criterion for exact algebras and nuclear absorption consequences.

L — Main Lean statement listed. Individual-to-strong pure infiniteness and the exact fixed-amplification implication are documented; O-infinity absorption is not separately selected.

10.25 The trace cone classifies Razak Jacelon stabilizations

Family 301 · 25 Sep 2026 · [Preprint page](#)

Claims classification of nuclear separable C^* -algebras after Razak-Jacelon and compact-operator stabilization by the full topological cone of lower-semicontinuous tracial weights.

N — No paper-specific Lean statement listed.

10.26 Radius of comparison equals half the mean dimension

Family 302 · 25 Sep 2026 · [Preprint page](#)

Claims that the comparison radius of a minimal homeomorphism crossed product equals half its mean dimension, including infinite values and associated zero-dimensional regularity equivalences.

N — No paper-specific Lean statement listed.

10.27 Filtered products and boundary preserving compression in complex cobordism

Family 302 · 25 Sep 2026 · [Preprint page](#)

Develops filtered-product and boundary-preserving compression tools in complex cobordism used in the comparison-radius/mean-dimension program.

N — No paper-specific Lean statement listed.

10.28 Quadratic Strong Operator Paving over Arbitrary Maximal Abelian Subalgebras

Family 300 · 25 Sep 2026 · [Preprint page](#)

Claims strong-operator paving over arbitrary maximal abelian subalgebras with a quadratic inverse-error block bound, after compression by a large projection.

N — No paper-specific Lean statement listed.

10.29 Approximation Paving over Arbitrary Maximal Abelian SubalgebrasFamily 300 · 25 Sep 2026 · [Preprint page](#)

Develops approximation-paving estimates for arbitrary maximal abelian subalgebras, supporting the strong-operator paving theorem.

N — No paper-specific Lean statement listed.

10.30 The arithmetic category and stable recovery of lattice factorsFamily 286 · 23 Sep 2026 · [Preprint page](#)

Recovers arithmetic group, cocycle, and amplification data from the finite-correspondence category of the stated twisted lattice factors.

N — No paper-specific Lean statement listed.

10.31 Arithmeticity of twisted finite correspondences for lattices over local fieldsFamily 286 · 23 Sep 2026 · [Preprint page](#)

Classifies finite-index bimodule correspondences for specified twisted factors of characteristic-zero property-T lattices using arithmetic commensurations and projective representations.

N — No paper-specific Lean statement listed.

10.32 Unitarizability implies amenability for discrete groupsFamily 251 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that a discrete group is amenable exactly when all uniformly bounded Hilbert-space representations are unitarizable.

L — Main Lean statement listed. The equivalence for all discrete groups and near-unitary nonunitarizable witnesses are documented.

10.33 Strong Ulam Stability Characterizes AmenabilityFamily 251 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims that strong operator-norm Ulam stability of approximate unitary representations characterizes amenability for countable groups.

N — No paper-specific Lean statement listed.

SECTION 11 / 21 MANUSCRIPTS

Kinetic theory, fluids, and dispersive equations

Global kinetic evolution, weak-solution nonuniqueness, Boltzmann-Grad limits, nonlinear waves, and computation in externally forced fluids. Forced-flow computation is not a claim about unforced Navier-Stokes regularity.

11.01 Global classical solutions of the three-dimensional relativistic Vlasov–Maxwell system

Family 362 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims global smooth well-posedness of the one-species relativistic Vlasov-Maxwell system for arbitrarily large admissible smooth data with compact particle support and finite field energy.

L — Main Lean statement listed. Global classical existence, uniqueness, and finite-time support control are documented; no smallness or symmetry is imposed.

11.02 Nonuniqueness with local conservation for the hard-sphere Boltzmann equation

Family 363 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Strengthens hard-sphere Boltzmann nonuniqueness to solutions satisfying the stated exact local mass, momentum, and energy conservation laws.

N — No paper-specific Lean statement listed.

11.03 Nonuniqueness for the periodic hard-sphere Boltzmann equation

Family 363 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs distinct global renormalized solutions of the periodic hard-sphere Boltzmann equation from the same nonnegative finite-entropy data.

L — Main Lean statement listed. Two solutions, local mass conservation, total momentum conservation, and global energy/entropy inequalities are documented; later local refinements are not.

11.04 The Boltzmann–Grad limit for stable radial potentials on regular kinetic intervals

Family 364 · 23 Sep 2026 · [Preprint page](#)

Claims a Newtonian-to-Boltzmann limit across the regular kinetic lifespan for stable finite-range radial potentials, allowing attractive wells and singular cores under detailed control assumptions.

N — No paper-specific Lean statement listed.

11.05 Hard-sphere fluctuations on the regular Boltzmann lifespan

Family 364 · 23 Sep 2026 · [Preprint page](#)

Studies hard-sphere fluctuations over the regular Boltzmann lifespan, with finite-dimensional convergence to a linear fluctuating Boltzmann description and exact microscopic centering.

N — No paper-specific Lean statement listed.

11.06 Stable Self-similar Blowup for a Supercritical Defocusing Schrodinger Equation on the Torus

Family 371 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims stable finite-time self-similar blowup for high-power scalar defocusing nonlinear Schrodinger equations on the twelve-dimensional torus.

P — Partial or narrower Lean scope. Blowup on an open Sobolev set is documented for arbitrarily large selected odd powers, not every sufficiently large odd power.

11.07 Computation under Rapidly Vanishing Navier–Stokes Forcing

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Encodes arbitrary finite-machine halting in a fluid-particle trajectory while smooth velocity and external force decay faster than every inverse power of time.

L — Main Lean statement listed. The effective halting detector from rest at fixed positive computable viscosity is documented, with the stated comparison-class uniqueness.

11.08 Universal Computation with Eventually Stationary Navier–Stokes Forcing

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies universal computation in viscous incompressible flow whose prescribed forcing is eventually stationary.

N — No paper-specific Lean statement listed.

11.09 Velocity Field Detection of Computation in Forced Navier–Stokes Flows

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Encodes halting in a velocity-field observation rather than only a particle trajectory, for smooth forced flows from rest.

L — Main Lean statement listed. Pointwise and integrated velocity detectors on the stated torus/cylindrical domains are documented.

11.10 Incompressible Box Transport and Finite Computation

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Realizes determinant-one maps between solid boxes by smooth divergence-free flows and uses them to implement finite computation.

L — Main Lean statement listed. Box transport and a fixed-particle halting detector in forced three-dimensional flow are documented.

11.11 A Fixed Particle Test for Computation in a Forced Viscous Flow

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Implements a fixed-particle trajectory test for computation in an externally forced viscous flow.

N — No paper-specific Lean statement listed.

11.12 Finite Instructions and Solenoidal Shear Flows

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Translates finite instruction systems into solenoidal shear-flow constructions supporting fluid computation.

N — No paper-specific Lean statement listed.

11.13 Geometric Programs for Solenoidal Forcing

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops geometric coding programs realized by divergence-free forcing in a three-dimensional viscous flow.

P — Partial or narrower Lean scope. Positive diagonal sheet programs are documented; this paper's fixed-particle detector and solid-box reciprocal maps are not.

11.14 Prefix Instructions and Incompressible Flows

Family 376 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Uses prefix-instruction encodings to construct incompressible computational flows.

N — No paper-specific Lean statement listed.

11.15 Scalar Potentials and Slow Clocks for Forced Fluid ComputationFamily 376 · 27 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops scalar-potential constructions and slow time parametrizations for computation in forced fluid motion.

N — No paper-specific Lean statement listed.

11.16 Critical local smoothing for the three-dimensional wave equationFamily 079 · 24 Sep 2026 · [Preprint page](#)

Claims the full strict local-smoothing range for the three-dimensional Euclidean wave equation, including the critical L3 estimate with arbitrarily small positive Sobolev loss.

N — No paper-specific Lean statement listed.

11.17 Endpoint pointwise convergence for the Schrodinger equation in higher dimensionsFamily 080 · 24 Sep 2026 · [Preprint page](#)

Claims almost-everywhere convergence to initial data at the sharp Sobolev endpoint for free Schrodinger evolution in higher dimensions.

N — No paper-specific Lean statement listed.

11.18 Endpoint convergence for the planar Schrodinger equationFamily 080 · 24 Sep 2026 · [Preprint page](#)Establishes the planar endpoint $H^{1/3}$ for almost-everywhere convergence of free Schrodinger evolution to its initial datum.

N — No paper-specific Lean statement listed.

11.19 Diagonal Fourier extension for positively curved surfaces in three dimensionsFamily 077 · 24 Sep 2026 · [Preprint page](#)Claims diagonal Fourier extension for every smooth compact positively curved surface in three dimensions throughout the conjectured strict range $p > 3$.

N — No paper-specific Lean statement listed.

11.20 Elliptic capacity propagation and Fourier restriction to the sphereFamily 077 · 24 Sep 2026 · [Preprint page](#)

Develops an elliptic-capacity propagation approach to sharp-range Fourier restriction for the sphere, relevant to dispersive estimates.

N — No paper-specific Lean statement listed.

11.21 Bochner Riesz Multipliers in Three DimensionsFamily 078 · 24 Sep 2026 · [Preprint page](#)

Claims the three-dimensional Bochner-Riesz multiplier conjecture throughout its strict exponent range, supplying a sharp harmonic-analysis tool for PDE.

N — No paper-specific Lean statement listed.

SECTION 12 / 31 MANUSCRIPTS

Classical dynamics, ergodic theory, and symplectic geometry

Chaos, mixing, billiards, periodic trajectories, Hamiltonian fixed points, and symplectic embedding problems. The ordering emphasizes consequences for dynamics before general ergodic and geometric methods.

12.01 Positive Metric Entropy for the Standard Map at Large Parameters

Family 146 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims positive area-metric entropy for the standard sine map at every sufficiently large parameter, not merely a generic or positive-measure parameter set.

L — Main Lean statement listed. Positive entropy, positive-area Lyapunov growth, and a hyperbolic ergodic component with Bernoulli iterates are documented.

12.02 Weak mixing of triangular billiards with an irrational angle

Family 150 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims weak mixing for the full billiard flow in every nondegenerate triangle with at least one angle irrational relative to π .

N — No paper-specific Lean statement listed.

12.03 Ergodicity of triangular billiards with an irrational angle

Family 150 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims full-phase-space ergodicity for all triangles with an irrational angle, without a Diophantine or genericity restriction.

L — Main Lean statement listed. Ergodicity, the almost-everywhere flow construction, and measure preservation are documented; the later weak-mixing theorem is separate.

12.04 Rokhlin's multiple mixing problem for one transformation

Family 145 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that ordinary mixing of one invertible probability-preserving transformation implies mixing of every finite order.

L — Main Lean statement listed. The full multiple-mixing implication as successive time gaps diverge is documented.

12.05 A smooth three torus diffeomorphism with simple Lebesgue spectrum

Family 144 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a smooth volume-preserving three-torus diffeomorphism with simple Lebesgue spectrum on its entire mean-zero L^2 space, addressing Banach's problem.

L — Main Lean statement listed. A real cyclic vector whose bilateral iterates form an orthonormal basis is documented.

12.06 Uniform bounds for planar polynomial limit cycles

Family 143 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a degree-only uniform finite bound for isolated limit cycles of planar polynomial vector fields, the quantitative part of Hilbert's sixteenth problem.

N — No paper-specific Lean statement listed. Only the quintic Lienard companion is named in the family's Lean scope.

12.07 Two limit cycles for quintic lienard systems

Family 143 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines the exact maximum of two limit cycles for quintic Lienard systems, with no sign or parity restriction.

L — [Main Lean statement listed](#). The upper bound and an example attaining it are documented.

12.08 Rigidity of Smooth Billiards with a Continuous Caustic Collar

Family 147 · 24 Sep 2026 · [Preprint page](#)

Claims that a smooth strictly convex billiard with a continuously foliated near-boundary caustic collar must be an ellipse.

N — No paper-specific Lean statement listed.

12.09 Continuous Phase Foliations Create Analytic Caustic Collars

Family 147 · 24 Sep 2026 · [Preprint page](#)

Develops analytic caustic-collar structure from continuous invariant phase foliations, supporting the near-boundary Birkhoff rigidity result.

N — No paper-specific Lean statement listed.

12.10 Entropy equality and local symmetry in negative curvature

Family 339 · 23 Sep 2026 · [Preprint page](#)

Claims that Liouville measure maximizes geodesic-flow entropy on a closed negatively curved manifold of dimension at least three exactly when the metric is locally symmetric.

N — No paper-specific Lean statement listed.

12.11 A counterexample to the nearby Lagrangian conjecture

Family 340 · 23 Sep 2026 · [Preprint page](#)

Constructs a closed exact Lagrangian in a high-dimensional cotangent bundle that is diffeomorphic to the base but not Hamiltonian isotopic to the zero section.

N — No paper-specific Lean statement listed.

12.12 Hamiltonian Fixed Points Below the Stable Morse Number in Dimension Twenty Two

Family 347 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims nondegenerate Hamiltonian fixed-point counts arbitrarily far below the stable Morse number on simply connected closed Kahler manifolds of real dimension 22.

N — No paper-specific Lean statement listed.

12.13 Hamiltonian Fixed Points Below the Stable Morse Number

Family 347 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Constructs Hamiltonian examples violating a stable-Morse-number lower bound on fixed points.

N — No paper-specific Lean statement listed.

12.14 Sharpness of the Cyclic Integral Floer Bound Below the Stable Morse Number

Family 347 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies sharpness of a cyclic integral Floer lower bound in examples lying below the stable Morse number.

N — No paper-specific Lean statement listed.

12.15 A nondegenerate counterexample to the Morse number Arnold bound

Family 347 · 23 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Constructs a nondegenerate Hamiltonian counterexample to the Morse-number form of Arnold's fixed-point bound.

N — No paper-specific Lean statement listed.

12.16 Three fixed points on the symplectic quadric threefold

Family 347 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a Hamiltonian diffeomorphism of the complex quadric threefold with exactly three fixed points, although every smooth function has at least four critical points.

L — Main Lean statement listed. The degenerate three-fixed-point counterexample is documented; the separate nondegenerate constructions are not.

12.17 Infinitely many closed geodesic images on every Riemannian sphere

Family 345 · 24 Sep 2026 · [Preprint page](#)

Claims infinitely many geometrically distinct prime closed geodesics on every Riemannian sphere, and on all closed three-manifolds and the stated spherical quotients.

N — No paper-specific Lean statement listed.

12.18 Symplectic Ball Packings in Higher Dimensions

Family 343 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines higher-dimensional symplectic ball packings by exactly the volume inequality and pairwise capacity inequalities, in every dimension at least six.

L — Main Lean statement listed. Necessity and sufficiency for closed source balls embedded into an open target ball are documented.

12.19 Symplectic Balls in Symmetric Polar Products

Family 087 · 22 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that every symmetric convex polar product has Gromov width four, with no smoothness or strict-convexity assumption.

L — Main Lean statement listed. Width four and embeddings below capacity four are documented; attainment at capacity four is not asserted.

12.20 The symmetric Mahler conjecture and its equality cases

Family 087 · 22 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves the sharp symmetric volume-product bound and classifies equality by Hanner bodies, a convex-geometric companion to polar-product symplectic estimates.

L — Main Lean statement listed. The geometric inequality and equality cases are documented; functional extensions are not.

12.21 The Mahler Conjecture for General Convex Bodies

Family 087 · 22 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the sharp nonsymmetric volume-product inequality, with simplices as the only minimizers.

L — Main Lean statement listed. The geometric inequality and simplex equality characterization are documented; the functional inequality is not.

12.22 Pointwise Multiple Ergodic Averages for Mixing Transformations

Family 154 · 4 Oct 2026 · [Preprint page](#)

Claims almost-everywhere convergence of arbitrary finite-length consecutive multiple ergodic averages for mixing transformations, without a mixing-rate assumption.

N — No paper-specific Lean statement listed.

12.23 Pointwise convergence of fourfold ergodic averages for mixing transformations

Family 154 · 4 Oct 2026 · [Preprint page](#)

Treats pointwise convergence of fourfold ergodic averages under ordinary mixing.

N — No paper-specific Lean statement listed.

12.24 Triple ergodic averages with distinct integer slopes

Family 154 · 4 Oct 2026 · [Preprint page](#)

Studies pointwise limits of triple ergodic averages with distinct integer time slopes.

N — No paper-specific Lean statement listed.

12.25 Pointwise convergence of triple ergodic averages for mixing transformations

Family 154 · 4 Oct 2026 · [Preprint page](#)

Establishes the triple-average case of the pointwise convergence program for mixing transformations.

N — No paper-specific Lean statement listed.

12.26 The entropy rate dimension formula for self-similar measures on the line

Family 148 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims the entropy-rate-over-Lyapunov formula for self-similar measures with unequal or signed contractions and exact overlaps.

L — Main Lean statement listed. The dimension formula and specified no-exact-overlap corollaries are documented; absolute continuity is not.

12.27 Arithmetic classification and non Pisot singularity for Bernoulli convolutions

Family 153 · 3 Oct 2026 · [Preprint page](#)

Claims an arithmetic classification of singular versus absolutely continuous Bernoulli convolutions, including a non-Pisot singular example from a quartic Salem number.

N — No paper-specific Lean statement listed.

12.28 A C1 Counterexample to the Entropy Conjecture

Family 151 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs a noninvertible C1 map with zero topological entropy but a homological eigenvalue two, refuting the general C1 entropy lower bound.

L — Main Lean statement listed. The smooth-manifold C1 counterexample and its second-homology action are documented.

12.29 A zero-entropy system without a smooth positive-volume model

Family 152 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims an ergodic zero-entropy system that has no smooth positive-volume model on any compact finite-dimensional manifold.

P — Partial or narrower Lean scope. The documented counterexample has finite entropy; the stronger zero-entropy assertion is not included.

12.30 Uniform Permanence in Weakly Reversible Mass Action Systems

Family 149 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims a compact absorbing region within every positive compatibility class of a weakly reversible mass-action reaction network, uniformly over that class.

N — No paper-specific Lean statement listed.

12.31 Boundedness and persistence of weakly reversible mass action systems

Family 149 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves global boundedness and separation from zero for positive solutions of finite weakly reversible mass-action networks with fixed positive rates.

L — Main Lean statement listed. Global solutions and bounds depending on the initial state are documented; the later classwise-uniform permanence result is separate.

SECTION 13 / 15 MANUSCRIPTS

Variational PDE, inverse problems, and geometric structures

An inclusive boundary of mathematical physics: phase-field equations, free boundaries, elasticity, transport, nonlinear potential theory, and symplectic/hyperkahler geometry. Purely algebraic or geometric papers without a comparably direct connection have been left out.

13.01 De Giorgis conjecture in dimension eight

Family 375 · 26 Sep 2026 · [Preprint page](#)

Claims planarity of monotone Allen-Cahn solutions in dimension eight, with a stronger classification of stable entire solutions in dimension seven.

N — No paper-specific Lean statement listed.

13.02 Smooth Anisotropic Uniqueness in the Calderón Problem from One Boundary Patch

Family 365 · 24 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Claims recovery of a smooth anisotropic metric from zero-frequency data on one boundary patch, modulo the natural boundary-fixing diffeomorphism ambiguity.

N — No paper-specific Lean statement listed.

13.03 Determination of a metric and a unitary connection from one boundary patch

Family 365 · 5 Oct 2026 · [Preprint page](#) · [Family Lean scope](#)

Extends one-patch inverse recovery to a metric and a rank-two unitary connection, modulo the stated diffeomorphism and gauge freedoms.

N — No paper-specific Lean statement listed.

13.04 Nonuniqueness for Bounded Measurable Scalar Conductivities in Three Dimensions

Family 365 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Constructs distinct uniformly positive measurable scalar conductivities with identical full boundary measurements, despite agreeing near the boundary.

L — Main Lean statement listed. The three-dimensional ball counterexample and equality of weak Dirichlet-to-Neumann operators are documented.

13.05 Global Uniqueness for the Smooth Isotropic Elasticity Inverse Problem

Family 372 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that full static boundary displacement-to-traction data determine both smooth Lamé moduli in three dimensions under the standard positivity conditions.

L — Main Lean statement listed. Global uniqueness is documented; a reconstruction algorithm is not part of the selected theorem.

13.06 The critical dimension for one phase Bernoulli minimizers

Family 367 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that seven is the first dimension admitting a nonflat minimizing cone for the one-phase Bernoulli problem, yielding sharp regularity thresholds.

P — Partial or narrower Lean scope. Only existence of a nonflat minimizing cone in dimension seven is documented; flatness below seven and singular-set bounds are not.

13.07 Interior regularity of planar Mumford Shah minimizers

Family 366 · 24 Sep 2026 · [Preprint page](#)

Claims the planar Mumford-Shah regularity classification: smooth crack arcs, crack tips, and 120-degree triple junctions with the stated local finiteness.

N — No paper-specific Lean statement listed.

13.08 The Isoperimetric Conjecture for the Cubic Flat Three Torus

Family 354 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines all area-minimizing regions at fixed volume in the cubic three-torus: balls, tubes, slabs, and complements, including the transition volumes.

L — Main Lean statement listed. The full profile and all minimizers, including equality at transitions, are documented.

13.09 Deforming hypersymplectic four manifolds to hyperkähler triples

Family 341 · 23 Sep 2026 · [Preprint page](#)

Claims that every positive closed two-form triple on a closed four-manifold deforms to a hyperkahler triple while preserving its three cohomology classes.

N — No paper-specific Lean statement listed.

13.10 Taming implies compatibility on four manifolds

Family 342 · 23 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims that every tamed almost-complex structure on a closed four-manifold admits a compatible symplectic form, with the almost-complex structure fixed.

L — Main Lean statement listed. The tamed-to-compatible implication is documented; the cohomology class of the compatible form is not prescribed.

13.11 Strong diffeomorphic approximation in three dimensions for $1 \leq p \leq 2$

Family 368 · 24 Sep 2026 · [Preprint page](#)

Claims strong smooth-diffeomorphism approximation of three-dimensional Sobolev homeomorphisms in the range $1 \leq p \leq 2$, retaining the target domain.

N — No paper-specific Lean statement listed.

13.12 Strong diffeomorphic approximation in three dimensions for $p > 2$

Family 368 · 24 Sep 2026 · [Preprint page](#)

Treats the $p > 2$ regime of strong diffeomorphic approximation for three-dimensional Sobolev homeomorphisms.

N — No paper-specific Lean statement listed.

13.13 The Subcritical Henon Lane Emden Conjecture

Family 370 · 24 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims nonexistence of positive entire solutions to weighted Lane-Emden systems below the critical hyperbola, without symmetry or growth assumptions.

L — Main Lean statement listed. The weighted subcritical nonexistence statement is documented; the critical equality case is not.

13.14 Sharp One Third Stability of Brenier Maps

Family 374 · 25 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Determines the sharp one-third Holder dependence of quadratic optimal transport maps on the target measure for uniform convex-body sources; stronger square-root stability fails.

L — Main Lean statement listed. The uniform one-third bound and sharpness using three-atom targets are documented.

13.15 Uniform interior $C^{1-\alpha}$ estimates for infinity-harmonic functions

Family 377 · 4 Oct 2026 · [Preprint page](#)

Claims dimension-dependent interior $C^{1-\alpha}$ estimates for infinity-harmonic functions in every dimension at least three, with a positive nonexplicit exponent.

N — No paper-specific Lean statement listed.

SECTION 14 / 12 MANUSCRIPTS

Adjacent probability: the Thorp-shuffle mixing program

Included at the broad edge of the seminar scope for its spectral, entropy, and mixing techniques. These are separate manuscripts within one result family, not twelve independent resolutions of a mixing conjecture.

14.01 Optimal order mixing of the Thorp shuffle

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Claims optimal logarithmic-order total-variation mixing of the full Thorp-shuffle permutation, uniformly over initial decks.

L — Main Lean statement listed. An $O(d)$ upper bound on 2^d cards and the matching order lower bound are documented.

14.02 Random subspace tests and trace smoothing for coordinate sweeps

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Uses random-subspace tests and trace smoothing to bound the full permutation law after a fixed number of coordinate sweeps.

L — Main Lean statement listed. The uniform trace bound and $O(d)$ physical-shuffle mixing upper bound are documented.

14.03 Conditional permutations in a revealed switching environment

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops conditional permutation estimates in a revealed-path environment and derives full-deck mixing.

L — Main Lean statement listed. Averaged conditional mixing and an $O(d)$ full-deck bound are documented; the conditional bound is not pointwise in every environment.

14.04 Row column symmetry and contraction of coordinate sweeps

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Uses row-column representation symmetry to prove contraction of coordinate sweeps toward permutation mixing.

P — Partial or narrower Lean scope. Weighted Schatten moments and operator contraction are documented; the paper's full physical-mixing conclusion is not.

14.05 Conditional coordinate sweeps and analytic transfer

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Combines trajectory-conditioned moment estimates with analytic transfer to binary sweeps, leading to optimal-order shuffle mixing.

P — Partial or narrower Lean scope. Binary-sweep contraction and abstract total-variation convergence are documented; identification with the physical-shuffle law is not.

14.06 Compatibility entropy and the spectrum of a Thorp sweep

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Relates compatibility entropy to spectral control of a Thorp sweep and the logarithmic mixing scale.

P — Partial or narrower Lean scope. A weighted rectangular compatibility estimate is documented; bounded regular moments and other rank conclusions are not.

14.07 Signed tensor densities and diagram budgets for the Thorp shuffle

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Uses signed tensor densities and representation-diagram budgets to control full-density mixing after coordinate sweeps.

P — Partial or narrower Lean scope. Selected signed representation/angle estimates are documented; full L2 or total-variation mixing is not.

14.08 Routing densities and representation contraction for Thorp sweeps

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Develops routing-density, trace, and representation estimates in dense and sparse regimes for Thorp sweeps.

P — Partial or narrower Lean scope. Nine earlier selected estimates are documented with a cutoff hypothesis; revised later statements and six other blocks are excluded.

14.09 From partial permutation information to Fourier bounds

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Converts partial-permutation information into bounds on irreducible Fourier transforms, supplying input to shuffle mixing.

P — Partial or narrower Lean scope. A finite coset-cap-to-Fourier estimate is documented; the paper's asymptotic two-permutation conclusion is not.

14.10 Random coordinate frames and partial permutation laws

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Develops random-coordinate frames and partial-permutation laws as inputs to the shuffle's information and representation estimates.

N — No paper-specific Lean statement listed.

14.11 Conditional information under deterministic coordinate sweeps

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Family Lean scope](#)

Studies conditional information under deterministic coordinate sweeps, a supporting component of the mixing program.

N — No paper-specific Lean statement listed.

14.12 A strict four row permanent inequality and permutation moments

Family 238 · 26 Sep 2026 · [Preprint page](#) · [Lean scope](#)

Proves a strict permanent inequality near the uniform law on four-element permutations and uses it to control permutation moments.

P — Partial or narrower Lean scope. The permanent inequality is documented; its Thorp mixing consequence is not.

Sources and selection notes

The catalogue describes the public repository as checked on 7 October 2026. The repository reports 722 manuscripts in 372 families. This selection contains 287 manuscripts from 127 of those families.

Repository README

Collection size, provenance, version policy, and the warning that results are at different stages of verification.

Individual manuscript map

Manuscript titles, abstracts, family assignments, and directory links. This is the principal bibliographic source.

Family overview

Family descriptions and the native subject classification. The overview is dated 6 October 2026.

Formalization catalogue

Mapping between the repository families and the available formal proof configurations.

Lean scope notes

Per-family descriptions of exactly which selected statements are formalized and which stronger conclusions are excluded.

Comparator instructions

The repository's instructions for separately checking selected Lean statements. No such builds were run for this catalogue.

Selection boundary

The selection includes every manuscript in the native probability/statistical-mechanics families 211–239, mathematical-physics families 260–284, operator-algebra families 285–303, dynamical-systems families 143–154, and PDE families 362–377. Related families were added for spectral theory, random matrices, crystallization, symplectic and field-theoretic structures, and computational complexity of physical models.

Topics at the outer edge are retained to reduce the risk of missing a relevant seminar subject. Pure number theory, unrelated algebra, and purely geometric work without a comparably direct physical connection are not exhaustively represented. The Thorp-shuffle program is explicitly separated as adjacent probability.

Interpretation of status and ranking

The L/P/N classification is an editorial reading of the published scope notes, not an official repository label and not a measure of mathematical correctness. N can occur even when another paper in the same family formalizes a closely related conclusion; such cases are stated in the entry. A finite numerical or interval certificate is distinct from a Lean formalization.

“Most surprising” is necessarily judgmental. The ordering emphasizes the potential implications of the stated results, while keeping companion papers together. It does not establish that a claim is new, that it has been accepted by specialists, or that it is independent of other work.