Research Proposal: Luck Mechanics as Probabilistic Wavefunction Algebra and Geometry

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Abstract

This research program develops a unified framework called *Luck Mechanics*, which treats chance as a quantifiable probabilistic field embedded in both mathematical and physical structures. The central thesis is that "luck" can be formalized as interference of probabilistic wavefunctions, compactified infinities, and harmonic arithmetic symmetries. The framework is explored through seven interlinked papers:

1. Compactification of infinity (limits to complex infinities),
2. Prime periodicity as sinusoidal interference (wavefunction sieve),
3. Prime numbers as superposed wavefunctions (harmonic coverage & computation),
4. Attention and frequency models for AI and human consciousness,
5. Polar ripple mapping of quantum mechanics,
6. Spacetime as polar optics (gravity as interference),
7. A flagship synthesis paper tying all components together.

Each paper develops its own mathematical proofs, applications, and testable hypotheses, while contributing to the overall claim: **Luck is a quantifiable field spanning physics, mathematics, and cognition.**

Contents

1 Overarching Thesis

Luck = (Opportunity × Preparation_Action) + Prepared Circumstance.

$$\mathcal{L}(x,t) = (\mathcal{O}(x,t) \cdot \mathcal{P}(x,t)) + \mathcal{C}(x,t).$$

Here:

- $\mathcal{O}$ = opportunity field (external probabilistic events),
- $\mathcal{P}$ = preparation-action field (internal readiness, amplification),
- $\mathcal{C}$ = prepared circumstance (bias or baseline field).

$\mathcal{L}(x,t)$ is sinusoidal with bias, representing constructive or destructive interference of chance. Luck cones = overlapping light cones of probability.

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2 Paper 1: Limits to Complex Infinities (Compactification Engine)

2.1 Core Claim

Infinity can be compactified on curved surfaces, ensuring finite yet detailed mapping. This underwrites probability fields with stable boundaries.

2.2 Mathematics

$$f : \mathbb{R} \to S^1, \quad f(x) = (\cos(\alpha x), \sin(\alpha x)), \quad \alpha = \tfrac{1}{R}.$$

$$\Phi(z) = \left(\tfrac{2\Re(z)}{|z|^2+1}, \tfrac{2\Im(z)}{|z|^2+1}, \tfrac{|z|^2-1}{|z|^2+1}\right).$$

- Φ = stereographic projection mapping $\mathbb{C} \cup \{\infty\}$ to Riemann sphere. - Compactification makes $+\infty$ and $-\infty$ continuous endpoints. - π as scaling constant ensures irrational spacing $\to$ dense mapping.

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3 Paper 2: Wavefunction Sieve of Eratosthenes (Prime Periodicity as Interference)

3.1 Core Claim

Primes are surviving amplitudes after interference of periodic waves.

3.2 Mathematics

For prime p:

$$\psi_p(n) = \sin\Big(\frac{2\pi n}{p}\Big).$$

Composite-sieve wavefunction:

$$\Psi_P(n) = \prod_{\substack{p \text{ prime} \\ p \le P}} \sin\Big(\frac{2\pi n}{p}\Big).$$

Properties:

- If n is composite, $\Psi_P(n) = 0$.
- If n is prime, $\Psi_P(n) \neq 0$.

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4 Paper 3: Prime Numbers as Superposed Wavefunctions (Harmonic Coverage & Computation)

4.1 Core Claim

Primes behave as fundamental harmonics; coverage ratios describe their rarity.

4.2 Mathematics

Define cosine prime wave:

$$_p(n) = \cos\Big(\tfrac{2\pi n}{p}\Big).$$

Total superposition:

$$_{\text{tot}}(n) = \sum_{p\in} {}_p(n).$$

Coverage ratio:

$$f(p) = \frac{1}{p}\prod_{q<p}\Big(1 - \frac{1}{q}\Big).$$

Interpretation:

- Larger primes contribute smaller $f(p)$.
- Rareness $\sim 1/\ln p$ (Prime Number Theorem).

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5 Paper 4: Attention & Frequency Models (AI & Consciousness)

5.1 Core Claim

Brains and AI attention behave as probabilistic frequency filters, amplifying selected chance amplitudes.

5.2 Mathematics

Attention operator:

$$\mathcal{A}[f](t) = \int K(\omega)\, \hat{f}(\omega) e^{i\omega t}\, d\omega,$$

where $K(\omega)$ is an attention kernel. Luck in cognition:

$$\mathsf{Luck}_{\text{cog}}(t) = \left|\langle \Psi | \mathcal{A} | \Psi \rangle\right|^2.$$

Interpretation: - Attention = phase-selective amplification. - Consciousness = probabilistic resonance in frequency space.

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6 Paper 5: Polar Ripple Framework (Radial–Angular Quantum Representation)

6.1 Core Claim

Quantum states can be mapped as polar ripples with $r = ct$, θ = space.

6.2 Mathematics

Coordinate transform:

$$r = ct, \qquad \theta(x) = 2\pi \frac{x + L/2}{L}.$$

Polar wavefunction:

$$\tilde{\Psi}(r, \theta) = \sqrt{\tfrac{2\pi}{L}}\, \Psi(x(\theta), t).$$

Luck cones = overlapping angular ripple sectors.

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7 Paper 6: Spacetime as Polar Optics (Unification Ansatz)

7.1 Core Claim

Gravity emerges from overlapping quantum phases on a radial–angular manifold.

7.2 Mathematics

Action:

$$S[,g] = \int d^4x\sqrt{-g}\Big[\tfrac{1}{2\kappa}R + \tfrac{\xi}{2}\nabla_\mu\nabla^{\mu *} - V(||)\Big].$$

Stress-energy of phase:

$$T^{(\phi)}_{\mu\nu} = \xi\big(\nabla_\mu\phi\nabla_\nu\phi - \tfrac{1}{2}g_{\mu\nu}(\nabla\phi)^2\big).$$

Particles = compactified standing modes:

$$n\lambda = L_\theta(r), \quad k_n = \tfrac{2\pi n}{L_\theta(r)}.$$

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8 Paper 7: Flagship Synthesis

8.1 Goal

Unify compactification, prime interference, harmonic computation, polar ripple quantum mechanics, and polar optics gravity into one coherent thesis.

Main claim:

Luck is a measurable field of probabilistic interference, spanning mathematics, physics, and

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9 Expected Outcomes

1. A compactification-based theory of infinite limits.
2. A sinusoidal interference model of prime rarity.
3. A harmonic superposition method for computation.
4. A frequency-attention model for AI and brains.
5. A polar coordinate representation for quantum mechanics.
6. A polar optics unification of gravity and quantum fields.
7. A flagship synthesis tying all results into “Luck Mechanics”.