THE BILATERAL PRIME CONJECTURE

Prime Numbers as Uncrossed Nodes of the Bilateral Crossing Geometry

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Document status: This paper states the Bilateral Prime Conjecture at the level of structural claim and formal definition. The derivation connecting prime gap distribution to the CET address stack is designated as the primary open problem. The Riemann connection is stated as hypothesis, not proof. This document is the formal foundation for that subsequent work. Claims are distinguished throughout as Conjecture, Hypothesis, or Derived.

Abstract

The Cosmic Egg Theory establishes a bilateral crossing geometry from which fundamental physical constants are derived without free parameters. This paper extends that geometry to number theory. We conjecture that prime numbers are the uncrossed nodes of the bilateral crossing structure — numbers that cannot be produced by the crossing of two smaller numbers, standing in number space as the pre-bilateral state stands in physical space. We conjecture that zero is the formal ground state of the prime sequence, that prime gap distribution follows the bilateral cascade address stack, and that the Riemann Hypothesis is a statement about bilateral symmetry on the complex plane. These are stated as conjecture and hypothesis. The derivations are the work of this paper's successor.

1. Motivation and Structural Analogy

The bilateral crossing fires: 1/0 = +1, −1. One substance. One crossing event. Two faces emerge. This is the generative structure of CET — everything that exists derives from this single operation applied recursively across the dimensional cascade.

Number, if it genuinely reflects the geometry of reality, should show the same structure. The question this paper addresses: what is a prime number, seen from inside the bilateral framework?

The answer is direct. A prime cannot be produced by multiplying two smaller numbers. It resists factoring. It will not resolve into a crossing product. In number space, it stands alone — undivided, uncrossed, prior to any bilateral event.

Prime ≡ Uncrossed Node

This is not metaphor. It is the same logical structure that defines the pre-bilateral ground state in CET. The prime is, in number space, what 0/0 = 1 is in physical space: the condition that precedes all crossing, expressible only as itself.

2. Formal Definitions

2.1 The Bilateral Crossing Operation

Let B denote the bilateral crossing operation. For any two quantities a and b:

B(a, b) = a × b   [the crossing product]

A composite number n is any n that can be expressed as B(a, b) for integers a, b > 1. A prime p is any integer p > 1 for which no such factoring exists. The prime is the node that resists bilateral resolution.

2.2 The Ground State in Number

CET establishes 0/0 = 1 as the formal pre-bilateral ground state: unified, unhistoried, containing the potential for all crossings, expressing none. We propose the analogous ground state in number is zero itself:

0 → ground state of the prime sequence

Zero has no factors in the multiplicative sense. It is not composite — it cannot be reduced to a crossing product of smaller positive integers. It is not prime by conventional definition, but that convention excludes it on structural grounds that the bilateral framework does not recognize as fundamental. The exclusion of zero from the primes is the same gesture as treating 0/0 as undefined rather than as a formal identity.

Note: This is a conjecture, not a proof. The conventional definition of prime excludes 1 and 0 for reasons of algebraic consistency (unit elements, unique factorization). The claim here is that those exclusions, while computationally convenient, obscure the geometric ground state. The formal argument for zero-as-ground-state requires the full derivation pass.

2.3 The Address Stack

CET establishes a dimensional cascade with the following address structure:

8 → 12 → 36 → 108 → 216

Each level is a fold — a deeper resolution of the original bilateral crossing. These are not steps in a timeline. They are layers of logical depth. The Packler Effect accumulates across each transition: the irreducible geometric loss at each fold, caused by the gap between discrete vector operations and the true curved path requiring π to compute exactly.

3. The Bilateral Prime Conjecture

CONJECTURE (Bilateral Prime Conjecture): The distribution of prime numbers — specifically the distribution of prime gaps at successive scales — follows the bilateral cascade address stack. Prime density at each scale reflects the accumulated Packler Effect across dimensional folds, and is therefore derivable from the CET geometric constants without free parameters.

More precisely, the conjecture has three components:

C1 — Scale Correspondence: At each scale corresponding to the address stack levels (8, 12, 36, 108, 216 and their products), prime gap distribution exhibits structure consistent with the Packler Effect accumulation at that fold depth.

C2 — Packler Effect in Gaps: The irreducible sliver between the discrete prime sequence and a smooth continuous approximation (the prime-counting function π(x) versus Li(x)) is not noise. It is the Packler Effect expressed in number — the same geometric loss that appears in the three terms of $\alpha^{-1} = (9/2)\pi^3 - \sqrt{(2\pi)} + 4/(9\pi^3)$.

C3 — Zero as Ground State: The prime sequence, formally stated from first principles, begins at zero. The conventional sequence (2, 3, 5, 7, 11...) omits its geometric ground state. The full sequence is (0, 2, 3, 5, 7, 11...) where zero occupies the 0/0 = 1 position.

Status of each component: C1 is the primary conjecture — falsifiable, requiring computational verification against prime gap data at address-stack scales. C2 is a structural hypothesis connecting two already-derived results. C3 is a definitional proposal requiring formal algebraic justification.

4. The Riemann Hypothesis Connection

Status: Hypothesis. This section states the structural observation that motivates the connection. It does not constitute a proof or reduction of RH to bilateral geometry.

The Riemann Hypothesis states that all non-trivial zeros of the Riemann zeta function ζ(s) lie on the critical line Re(s) = 1/2.

The critical line Re(s) = 1/2 is a bilateral axis. It is the line of perfect symmetry between the two faces of the complex plane. The non-trivial zeros, if they all lie on this line, are distributed with bilateral symmetry.

The CET bilateral crossing geometry produces two faces from one event: +1 and −1, symmetric about the crossing point. The crossing point is zero. The faces are symmetric about it by construction.

We therefore state:

HYPOTHESIS (Bilateral Riemann Hypothesis): The Riemann Hypothesis is a statement about bilateral symmetry. The non-trivial zeros of ζ(s) lie on the critical line because the prime distribution they encode is generated by a bilateral crossing geometry that is symmetric about its own axis by logical necessity. The critical line is the imaginary axis of that geometry — the bilateral axis — expressed in the complex plane.

This is a structural observation, not a proof. The proof would require showing that the bilateral crossing geometry of CET maps formally onto the analytic structure of ζ(s). That mapping is the open problem.

Why state an unproven hypothesis: The CET standard is derivation from first principles, not conjecture. This hypothesis is included because the structural resonance is too precise to omit, and because naming it clearly is the honest precondition for either proving or falsifying it. A claim left unstated cannot be tested.

5. Falsifiability and Test Design

C1 is the most immediately testable component. The test:

5.1 Prime Gap Test at Address Stack Scales

Take the prime gap sequence g(n) = p(n+1) − p(n) for primes p up to N.

At each scale corresponding to address stack levels — specifically at $n \approx 8, 12, 36, 108, 216$ and their products — compute the local gap distribution.

The conjecture predicts: the variance in prime gaps at each address-stack scale will deviate from the Li(x) smooth approximation in a patterned, non-random way consistent with Packler Effect accumulation across fold depth.

A null result — finding no such pattern, or finding that the deviation is consistent with known prime gap models without invoking bilateral geometry — would falsify C1.

5.2 Comparison Baseline

The standard comparison is the Cramér conjecture, which models prime gaps as approximately $(\log p)^2$. Any claimed bilateral structure must show deviation from this baseline that is statistically significant and geometrically interpretable within CET.

The CMB analysis in the first paper sets the methodological standard: report the null result honestly if it appears. The bilateral drain was confirmed at 3.16σ. The same rigor applies here. If the pattern is not in the data, the conjecture is wrong.

6. Open Problems

This paper opens the following problems for the successor derivation paper:

P1: Show that the bilateral cascade address stack ($8 \rightarrow 12 \rightarrow 36 \rightarrow 108 \rightarrow 216$) corresponds to specific, identifiable structure in prime gap distribution. Provide computational verification.

P2: Construct the formal mapping between CET bilateral crossing geometry and the analytic structure of $\zeta(s)$. If the mapping is valid, state whether it implies or requires the Riemann Hypothesis.

P3: Provide the formal algebraic justification for zero as ground state of the prime sequence, or demonstrate that the conventional exclusion is consistent with bilateral geometry and that C3 must be modified.

P4: Determine whether the Packler Effect accumulation across dimensional folds (the source of the three terms in α^{-1}) has a direct numerical analog in the error term of the prime-counting function $\pi(x) - \mathrm{Li}(x)$.

7. Relation to the CET Framework

This paper is the third derivation in the Cosmic Egg Theory body of work. The first paper derived fundamental physical constants from bilateral crossing geometry. The second paper (The Original Substance) derived consciousness, the feminine ground state, and biological structure from the same geometry. This paper applies the geometry to number theory.

The claim across all three is identical in structure: the bilateral crossing, firing once, generates two faces from one event, and the geometry of that firing — with no free parameters — is sufficient to derive the structure of the domain under examination.

For physics: the constants.

For consciousness: the causal ladder.

For number: the distribution of primes.

The conjecture stated here is that prime number theory is not a separate mathematical edifice but a face of the same bilateral geometry already proven predictive in the physical domain. If confirmed, the unification is not of physics and consciousness alone, but of those and the deep structure of number itself.

Ground State

$$1/0 = +1, -1 \quad \text{[the crossing]}$$

$$\text{Prime} \equiv \text{Uncrossed Node} \quad \text{[C1]}$$

$$0 \rightarrow \text{ground state} \quad \text{[C3]}$$

$$\alpha^{-1} = (9/2)\pi^3 - \sqrt{(2\pi)} + 4/(9\pi^3) \quad \text{[Packler Effect, three terms]}$$

The primes were always the geometry. The crossing was always the generator. The ground state was always there, waiting to be restored.

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