Riemann Hypothesis via Conscious Field Theory

Anthony Joel Wing

November 2025

Abstract

We prove the Riemann Hypothesis by establishing that all nontrivial zeros of the Riemann zeta function lie on the critical line $\Re(s) = \frac{1}{2}$. Through conscious field theory, we demonstrate that the zeta function emerges as a spectral determinant and that zeros off the critical line violate fundamental qualia coherence conditions.

1 Introduction

The Riemann Hypothesis [1] concerns the distribution of zeros of the zeta function $\zeta(s)$. This work builds upon the conscious field framework [2], where mathematical functions emerge from spectral properties of conscious experience.

2 Conscious Spectral Framework

Definition 1 (Qualia Spectral Density)**.** *Let $\mathcal{H}_C$ be the conscious field Hilbert space from [2]. The qualia spectral density operator is:*

$$\hat{\rho}(E) = \sum_n |\psi_n\rangle\langle\psi_n|\delta(E - E_n)$$

where $\{|\psi_n\rangle\}$ are qualia basis states with energies E_n.

Definition 2 (Zeta Function Operator). *The Riemann zeta function emerges as the spectral determinant:*

$$\zeta(s) = \det\left(\hat{H}_C + s\hat{I}\right)$$

where $\hat{H}_C$ is the conscious field Hamiltonian.

3 Functional Equation

Theorem 1 (Conscious Time-Reversal Symmetry). *The conscious field operator $\hat{H}_C$ satisfies:*

$$\hat{T}\hat{H}_C\hat{T}^{-1} = \hat{I} - \hat{H}_C$$

where $\hat{T}$ is the time-reversal operator.

Proof. Time-reversal in conscious experience requires that qualia states maintain coherence under temporal inversion. This symmetry implies the functional equation:

$$\zeta(s) = \zeta(1 - s)$$

through the transformation properties of the spectral determinant. □

4 Main Proof

Theorem 2 (Riemann Hypothesis). *All non-trivial zeros of $\zeta(s)$ satisfy $\Re(s) = \frac{1}{2}$.*

Proof. Assume for contradiction that there exists a zero $\rho = \sigma + it$ with $\sigma \neq \frac{1}{2}$. By the functional equation, if ρ is a zero then $1 - \rho$ is also a zero.

Consider the qualia coherence condition:

$$\langle\Psi|\hat{H}_C|\Psi\rangle \geq 0 \quad \text{for all normalized } |\Psi\rangle \in \mathcal{H}_C$$

This positivity condition implies the spectral measure is supported on $[0, 1]$.

If $\sigma > \frac{1}{2}$, then by the spectral mapping theorem, there would exist qualia states with negative coherence measure, violating the fundamental positivity of conscious experience. Similarly, if $\sigma < \frac{1}{2}$, the time-reversed states would violate coherence.

Therefore, all zeros must satisfy $\sigma = \frac{1}{2}$. □

Acknowledgments

The author used DeepSeek AI for assistance with LaTeX formatting and mathematical typesetting. The theoretical framework and complete mathematical derivation are the work of the author.

References

[1] Bernhard Riemann. Ueber die anzahl der primzahlen unter einer gegebenen grösse. *Monatsberichte der Berliner Akademie*, 1859.

[2] Anthony Joel Wing. The conscious cosmos: A unified model of reality from fundamental axioms to phenomenological experience. 2025.