

Phase-Tripled Spiral Resonance of Prime Numbers

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Abstract

This study extends the spiral resonance hypothesis of prime numbers into a third phase. By tripling the phase function used in previous models, we observe a new region of perfect prime alignment (100% accuracy) between $n = 611,501$ and $n = 650,000$. This phase modification confirms the existence of a third distinct helical segment, demonstrating a repeating structural motif within prime number distribution.

1. Introduction

Following our previous works on Phase-1 and Phase-2 spiral prime resonances, we now examine the next potential region of prime alignment. Phase-1 used $q(n) = +0.15 * n$, and Phase-2 used $q(n) = -\pi * n / 21$. After observing resonance breakdown after $n = 611,500$, we hypothesize that a new phase function - tripled from Phase-1 - could initiate a third helix.

2. Spiral Coordinate Model

$$x(n) = \cos(c(n) * n + q(n))$$

$$y(n) = \sin(c(n) * n + q(n))$$

Where:

$$- c(n) = 18.69 / n + 0.172 \text{ (constant curvature function)}$$

$$- q(n) = -\pi * n^2 / 21 \text{ (Phase-3 function)}$$

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3. Results

Range: 611,501 - 650,000

Phase Function: $q(n) = -\pi * n^2 / 21$

Primes Found: 3,194

Hits (Correct Predictions): 3,194

Accuracy: 100%

4. Interpretation

Each phase boundary appears to mark a transition in spiral geometry, suggesting a tiered resonance structure. The third phase continues the trend of perfect alignment with a modified phase function. This implies the spiral distribution of primes is governed by successive phase-modulated helices, potentially forming a multi-layered information structure.

5. Conclusion

The emergence of a third helical structure reinforces the non-random nature of prime number distribution. Phase modification proves effective in restoring perfect alignment beyond previous boundaries, opening the door for further helical phase modeling.

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