# Behavior of Non-trivial Zeros and Prime Numbers in Riemann Hypothesis

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**Abstract**

**The Riemann Hypothesis proposes a specific location (the critical line) for the non-trivial zeros of the Riemann zeta function. This paper argues that the aperiodicity observed in the distribution of these non-trivial zeros and the distribution of primes numbers is a fundamental property. A periodic zeta function would significantly alter its behavior, rendering it irrelevant to studying prime number distribution. Conversely, a periodic pattern in prime numbers or a deviation of non-trivial zeros from the critical line would disprove the Riemann Hypothesis. The observed aperiodicity in both prime number distribution and the zeta function's non-trivial zeros strengthens the case for the Hypothesis' validity. This aperiodicity suggests a deeper connection between prime numbers and the zeta function, one that wouldn't exist with a periodic structure.**

## I

**Riemann Hypothesis is a famous unsolved problem states that all the non-trivial zeros of the zeta function lie on a specific line called the critical line (where the real part of the complex number s is ½). While the function itself isn't periodic, the distribution of its zeros might be considered "almost periodic" in a certain sense.**

## II

**There's a conjecture called the Osgood conjecture that suggests the zeros have a certain density on the critical line. This means there's a predictable average number of zeros within a specific interval on the line as you move along it. However, the exact location of each zero isn't periodic and doesn't follow a simple repeating pattern. They are spread out irregularly along the critical line.**

## III

**The Riemann zeta function itself isn't periodic, but the distribution of its zeros might be considered "almost periodic" on the critical line, with a density but no exact repeating pattern. There are Billions of non-trivial zeros that lie on the critical line. It's similar to the center line in rule 30, it's aperiodic and does not repeat. One cannot predict since the non-trivial zeros are random. The non-trivial zeros will go on forever because the equation is similar to a computer program that does not halt(Rule 30 center line).**

## IV

**Prime Number theorem describes the approximate density of prime numbers as the numbers get larger. It states that the number of primes less than a given number x is roughly proportional to x / ln(x) (where ln(x) is the natural logarithm of x. This suggests a certain order and predictability to the distribution, even though the exact location of each prime number might seem random. Since the exact location has not been attained only the approximation, it is aperiodic. So, the exact location and the distribution of the non-trivial zeros or the exact location is aperiodic in the Riemann Zeta function. The distribution of primes has a certain order of predictability, but the exact location is only the approximation. (aperiodic)**

**V**

**The Riemann Hypothesis has nothing to do with chaos. It's important to understand that the aperiodicity of the Riemann zeta function is a fundamental property related to its connection with prime numbers. Modifying it to be periodic would significantly alter its behavior and wouldn't be particularly useful in the context of studying prime number distribution.**

**VI**

**If prime numbers exhibited a clear periodic pattern, it would suggest a more structured underlying mechanism for their distribution. This structure might be reflected in the location of the Riemann non-trivial zeros. If the non-trivial zeros deviate from the critical line or exhibit their own periodic behavior it would prove the Riemann Hypothesis false, but in the Riemann Zeta Function there is aperiodic distribution of prime numbers and aperiodic distribution of non-trivial zeros that are on the critical line, so the Riemann Hypothesis is true.**

## References


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