The wave function ψ of the Riemann Zeta function *ζ(0.5+it)*:
Applying the Hamiltonian to the wave function interpretation of Zeta to prove RH

Jason Cole
www.warpeddynamics.com

Abstract

The wave graph of Zeta ζ(0.5+it) can be interpreted as a wave function. From this interpretation, the curves represent the probability location of atoms and the nontrivial zeros represent zero probability. It's possible that the atoms represented by wave function curves of ζ(0.5+it) of Zeta are doing the repulsion based on GUE and not the nontrivial zeros. Within the context of Schrodinger equation, the Hamiltonian Operator can be applied to the Parity wave function interpretation of Zeta to yield energy values associated to the Zeta function. Because the Parity wave function is Hermitian it can cause this Zeta-Schrodinger equation to have real energy values.

The Riemann Zeta function is based on the following functional equation

$$\zeta(s) = 2^s \pi^{s-1} \sin\left(\frac{\pi s}{2}\right) \Gamma(1-s)\, \zeta(1-s). \quad \textbf{(1)}$$

Using the input of 0.5+it the Riemann Zeta function generates a wave graph that intersects the critical line at nontrivial zero(root) locations.

The following is the wave graph of Zeta function as ζ(0.5+it) showing it's real and imaginary part waves both intersecting at the nontrivial zero locations. The Riemann Hypothesis states that all the nontrivial zeros lie on the critical line.

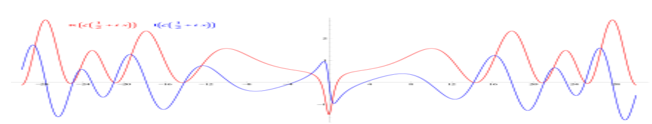


Fig. 1

One approach to proving Riemann Hypothesis is to map the nontrivial zeros of Zeta to a Quantum mechanical operator. However, attempting to map the nontrivial zeros to eigenvalues have fail short. This research takes a radically different approach in linking that Zeta function to Quantum mechanics were its operator is Hermitian and it's eigenvalue matches the nontrivial zeros of the Zeta function as a breakthrough towards proving R.H. For instance, the Zeta function wave graph above is conjectured to be based upon wave functions ψ graph below. In which the wave graph of Zeta ζ(0.5+it) is simply adjacent wave functions linked in a chain on the critical line.

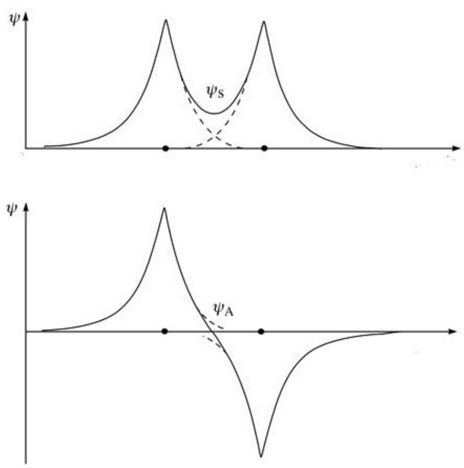


Fig. 2

Below is the wave function interpretation of the Zeta function were the dots highlight the locations of the atoms on the critical line with respect to their wave functions.

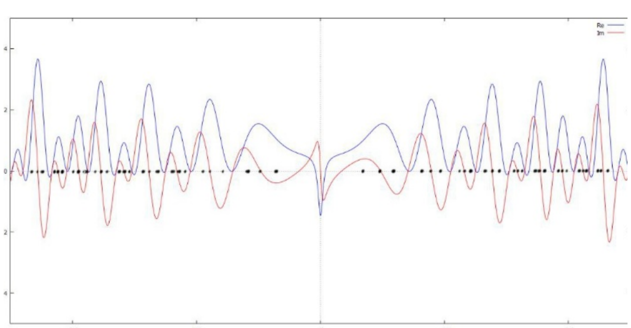


Fig 3

The following graph correlate Even and Odd Parity Operator wave function to the real and imaginary part of the previous wave Zeta graph.

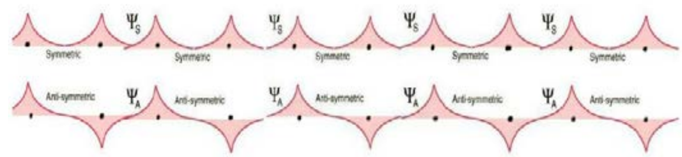


Fig. 4

The Even and Odd Parity Operator is a real value function but the new approach is to correlate the Real Part (Even curves) of the Zeta graph to the Even Parity and the imaginary part (Odd curves) of the Zeta graph to the Odd Parity Operator. That will be the basis for extending the Parity Operator into the Complex plane. Because, the Complex Parity Operator wave functions have complex conjugates they can be multiplied together to obtain real values. The Parity Operator wave function is Hermitian and can have eigenvalue the match the nontrivial zeros of the Zeta function with respect to correlating the wave graph of Zeta ζ(0.5+it) to the Parity Operator Wave function.

The following express is a mathematical correlation between the Parity Operator wave function to the Zeta function.

Even Zeta R(ζ(0.5+it) =R(ζ((0.5-it))
is equivalent to
Even Parity Pψ(x)=+1ψ(-x)
(2)

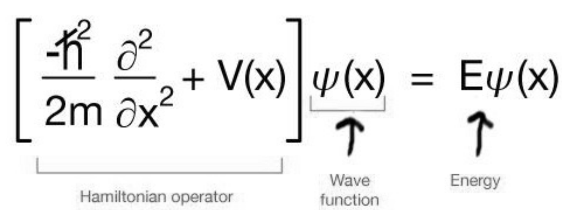
And

Odd Zeta I(ζ(0.5+it) = I(-ζ((0.5-it)))
is equivalent to
Odd Parity Pψ (x) = -1ψ (-x)
(3)

The Zeta function encodes Quantum information in it's wave function ψ graph of ζ(0.5+it)

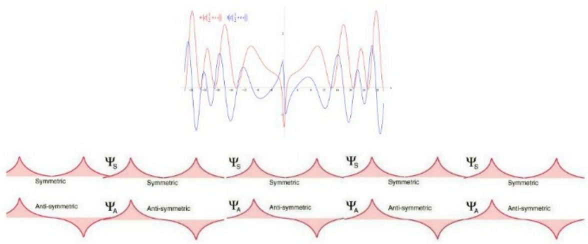
Most research attempting to connect the nontrivial zeros of Zeta to Quantum Mechanics is to only focus on the nontrivial zeros as discrete energy values of an Operator. That approach hasn't yield any fruitful results. This paper proposes that Mathematicians and Physicist don't focus solely on the discrete nontrivial zeros but the wave graph of Zeta ζ(0.5+it) related to the nontrivial zeros. The new approach is
interpreting the wave graph of Zeta ζ(0.5+it) as a wave function ψ. This wave function interpretation of the wave graph of Zeta identifies the Parity Operator wave function as the Operator behind the nontrivial zeros. From this wave function interpretation, we see an interesting arrangement of atomic nuclei locations and eigenvalues (nontrivial zeros) on the critical line of the Zeta function. This Complex version of the Parity Operator is Hermitian and it's eigenvalues matches the nontrivial zeros of the Zeta function. Because it is a Complex Parity wave function the complex conjugate wave functions can be multiplied together to yield real values.

Based on this wave function interpretation of Zeta we can represent that in the Schrodinger equation were the Hamiltonian is applied to the wave function graph interpretation of ζ(0.5+it) to yield real energy values. Because the Parity wave interpretation of Zeta is Hermitian the energies are real.



The Euler Product formula for the Parity Hermitian L-function Operator

Just as the Zeta functional equation and the new Complex Parity wave function can equal based on the graphs below that equality can apply to all values of Zeta. Meaning you can plug in real values only for the new Parity Hermitian L-function Operator and that will equal Zeta for values greater than 1 over the reals (Euler Product formula).



This paper doesn't provide the new Complex Parity wave function PSI equation that Mirrors the Zeta function but suggest such a wave equation exist. That equation can mirror all values of Zeta including Zeta values greater than 1 that also equals the Euler Product formula.

$$\sum_n \frac{1}{n^s} = \prod_p \frac{1}{1 - \frac{1}{p^s}}$$

References

1. Montgomery, Hugh L. (1973), "The pair correlation of zeros of the zeta function", Analytic number theory, Proc. Sympos. Pure Math., XXIV, Providence, R.I.: American Mathematical Society, pp. 181–193, MR 0337821.
2. Odlyzko, Andrew, Correspondence about the origins of the Hilbert–Polya Conjecture.
3. Rudnick, Zeev; Sarnak, Peter (1996), "Zeros of Principal L-functions and Random Matrix Theory", Duke Journal of Mathematics, 81: 269–322, doi:10.1215/s0012-7094-96-08115-6.
4. Jump up^ Berry, Michael V.; Keating, Jonathan P. (1999b), "The Riemann zeros and eigenvalue asymptotics" (PDF), SIAM Review, 41 (2): 236–266, doi:10.1137/s0036144598347497.

.