

Title: Riemann Hypothesis and General Relativity

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Dedicated to the memory of Friedrich Hund

Abstract

While the Riemann hypothesis is obtained from the analytical continuation of the Zeta function into the two-dimensional complex number space, it is here proposed that for its proof it must be extended to the three-dimensional space of physical reality of general relativity adopting Mach's formulation of general relativity proposed by Friedrich Hund, which permits to make a bridge to the prime numbers and the nontrivial zeros of the Zeta function.

1. In Mach's interpretation of general relativity by Hund [1], one assumes the existence of a universal material background as in the "Planck Mass Vacuum Conjecture" by the author [2], supported by the good agreement with the observational evidence of cold dark matter, and the prediction of the Finestructure Constant by Wilczek at the GUT energy scale [3]. In this conjecture the vacuum is a kind of positive-negative Planck mass plasma, with an excess of the positive over the negative masses by the positive gravitational interaction energy of positive with negative masses, very similar as for the positive-negative electrostatic interaction energy in condensed matter physics expressed by the Madelung constant [4].

2. A solution of the gravitational field equation, forming a bridge from the prime numbers to physics, is obtained by placing attractive mini-size black hole solutions at the zeros of the Zeta function, with each black hole making a gravitational well, and their sum an attractive logarithmic potential with an attractive force towards the line of the nontrivial zeros, with each black hole a "pole-dipole" particle.

References

1. F. Hund, Z. Physik 124, 742 (1948).
2. F. Winterberg, Z. Naturforsch. 58a, 231 (2003).
3. F. Wilczek, Nature (London) 397, 303 (1999).
4. F. Winterberg, Z. Naturforsch. 69a, 17 (2014).

