POSSIBLE PROOF OF THE RIEMANN HYPOTHESIS RESULTING FROM PREDICTION OF EXACT VALUES OF THE LANDAU CONSTANTS.

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Abstract: *Based on the predicted value of the Landau constants L = 0.5331588….and A = 0.7301772..., it is possible to identify the critical line x=0.5 with the horizon line. It is known that the size of entropy is proportional to the size of the surface of the horizon, and according to the holographic principle, all information must lie on this surface. So also the zero points of the Riemann Zeta function, which carry information about the distribution of prime numbers.*

1: LANDAU CONSTANTS

Landau's theorem [1], [2] says: If f(x) is a holomorphic function in the unit disk with the property f′(0)| = 1, then let L(f) be the radius of the largest disk contained in the image of f. Current estimates The Landau constants [3] are in the interval:

$$0.5 < L \leq \frac{\Gamma(\frac{1}{3})\Gamma(\frac{5}{6})}{\Gamma(\frac{1}{6})} \qquad (1)$$

The upper limit of L is expressed using the appropriate Gamma functions and has the value: 0.543258965432…….

For injective holomorfic function on the unit disk, constant A can be defined:

$$0.5 < A \leq 0.7853 \qquad (2)$$

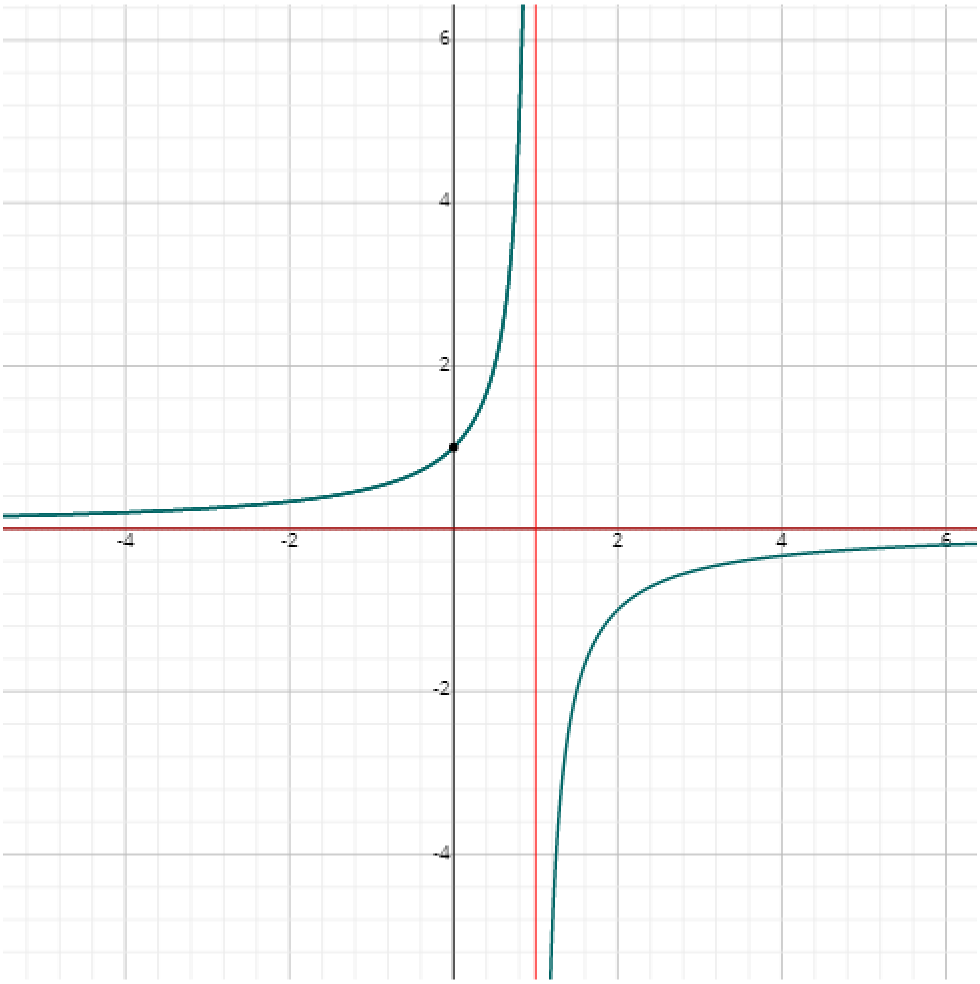
These constants have not been more accurately determined since 1937.

2: EQUATION OF THE UNIVERSE

We get the relevant equation by counting all dimensions of the Universe d. We obtain the relation:

$$\varphi_{(x)} = \sum_{d=1}^{\infty} x^{d} = \frac{1}{1-x} \tag{3}$$

This is a graph of function (3).



Graph of function (3), we are only interested x in the interval (- infinity, 1).

The graph shows the expansion of the Universe. The y-axis represents own time, which runs from zero to infinity. On the x-axis is real time, going from -infinity to 1. In the past, real time was negative, in the future it will be positive, in the present it has a value of 0. The difference between the flow of real and own time creates the illusion of dark energy, which is easy to see on the graph. The big bang is the same illusion because the Universe is infinite in time and space. The line x = 0.5 represents the future causal horizon. Therefore, we are not able to predict anything about the events beyond the point x = 0.5. We can prove it by calculating the probability density of the function (3), which can be considered as a wave function of the Universe. Let's remember that for the probability density holds:

$$\int_{-\infty}^{0.5} \varphi_{(x)}^{2}\, \mathrm{d}x = 1 \tag{4}$$

Therefore, the line x = 0.5 represents the future causal horizon, and the corresponding wave function can be normalized as follows.

$$\varphi_{(x)} = \frac{1}{\sqrt{2}(1-x)} \tag{5}$$

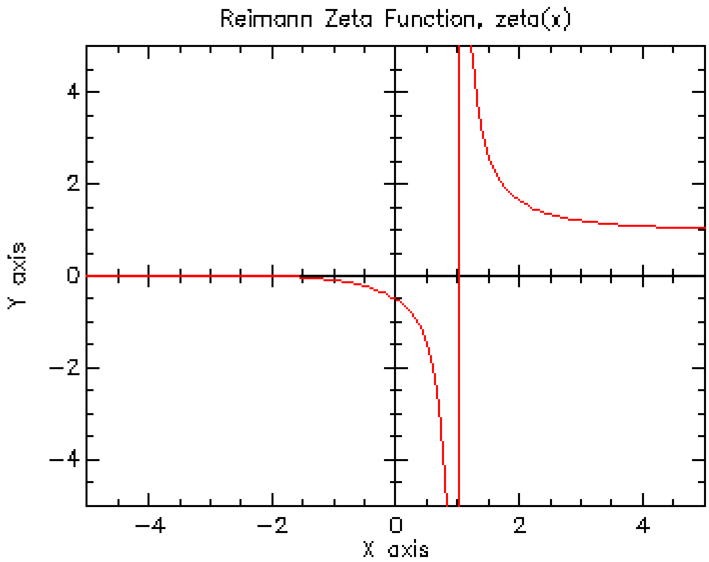
3: RIEMANN ZETA FUNCTION

The real part of the Riemann Zeta function in the interval x in (0 , 1) can be expressed in the form:

$$\zeta_{(x)} = -\varphi_{(x)} + \sigma_{(x)} \tag{6}$$

The second term on the right is a small deviation depending on x.

This is a graph of Zeta function:



Graph of Zeta function, we are only interested x in the interval (0 , 1).

Next, we will consider only the real parts of functions (3) and (6). We immediately see that for the derivative of function (3) at the point x = 0 holds:

$$\pm\frac{\mathrm{d}\varphi_{(0)}}{\mathrm{d}x} = 1 \qquad (7)$$

Then the ratio of the Zeta function and the negative value of the function (3) on the critical line at the point x = 0.5 will be:

$$-\frac{\zeta_{(0.5)}}{\varphi_{(0.5)}} = 0.7301772..... \qquad (8)$$

We assume that this is the exact value of Landau's third constant A. And we further assume that the square of A is equal to the Landau constant L. Entropy and the amount of information are proportional to the area of the horizon. and further L is a constant representing a non-injective set. Then

A = 0.7301772…….. (9)
L = 0.5331588…….. (10)

Finally, we can express the constant A as follows:

$$A = \frac{(\sqrt{2}+1)}{2}\sqrt{\frac{2}{\pi}}\int_0^\infty \frac{\sqrt{x}\,dx}{\cosh^2 x} \qquad (11)$$

CONCLUSIONS:

If we apply all this to our Universe, then the largest structures (superclusters or various domains) can have a size of 0.73 a, where a is gauge factor of the Universe. These structures are injective, they can be formed by matter, antimatter etc.. Theoretically the largest size of black holes can be 0.53 a. Black holes belong to the non-injective set.
Both Landau constants are related and they are in the predicted intervals of their values. Both refer to the critical line x = 0.5, which we can identify with the causal horizon.
If in the future it were proven that (9) and (10) are the exact value of the Landau constants A and L, it could mean a direct proof of the Riemann hypothesis.

REFERENCES:

[1]: Landau, Edmund (1929), "Über die Blochsche Konstante und zwei verwandte Weltkonstanten", Mathematische Zeitschrift, 30 (1): 608–634

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[3]: Ahlfors, L.V,,Grunsky,H, (1937), "Über die Blochsche Konstante". Mathematische Zeitschrift . 42 (1): 671-673.