Gravity and the hidden extra grid dimensions

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Abstract

The Bekenstein-Hawking entropy formula, derived from black hole entropy calculations, surprisingly shows that the maximum information bits concealed in any volume of space is limited by the area of its surrounding sphere divided by a pixel like information unit with a Planck area l_p^2 , where l_p^2 is the square of Planck length. This paper shows a connection between the information unit area and the gravitational constant, G. This connection leads to the idea of an extra grid like dimension dividing space into these information units. By its grid density, this extra dimension defines the curvature parameters of space, meaning the gravitational constant G.

Introduction

Based on the Bekenstein – Hawking formula [1], the maximum amount of elementary information bits (S), which can be concealed in a volume of space (Q), is proportional to the area of its surrounding sphere (A), divided by the square of Planck length (l_p^2). This dimension reduction from volume of space to area of the surrounding sphere, leads to the holographic principal idea [2].

$$S = \frac{K_B A}{4 l_p^2}$$

The square of Planck length (l_p^2), equals Planck constant (h), which is the key to quantum mechanics times the gravitational constant(G), which is the key to general relativity divided by the speed of light(c), which is the key to special relativity, in the power of 3, which is the number of spatial dimensions.

$$l_p^2 = \frac{hG}{c^3}$$

$$S = \frac{K_B A c^3}{4hG}$$

We can then show the connection between the gravitation constant (G), Planck constant, (h), speed of light (c), Boltzmann constant (K_B), the area of its surrounding sphere (A) and the max amount of information bits in a volume of space(S).

$$G = \frac{K_B A}{4S} * \frac{c^3}{h}$$

If we define the ratio between the max information concealed in a volume of space (S), and the area of its surrounding sphere (A), as the spherical information resolution (R), we can rewrite the equation above as:

$$G = \frac{K_B c^3}{4Rh}$$

$$R = \frac{S}{A}$$

Based on the equations above, an increase in R results in a decrease in the gravitational constant G meaning a decrease in the ability of energy and matter to curve space time.

Conclusion

There are two important questions arising from the relationship between G and R. What defines in empty space the information resolution R? What connects between G and R? This two questions lead to a revolutionary idea of hidden extra grid like three dimensions, dividing our space into three dimensional Planck sized units. By adding the extra grid dimensions we can now visualize what defines the information resolution R (figure 1). Let's assume that the grid dimension has a flexibility constant (F), its ability to curve due to matter and energy, proportional to its density (D). An increase in the information resolution R means an increase in the density D of the grid dimension, leading to a decrease in its flexibility F to curve, due to the existence of mass and energy (figure 2). This leads to the opposite relationship between G and R, where an increase in R leads to a decrease in G.

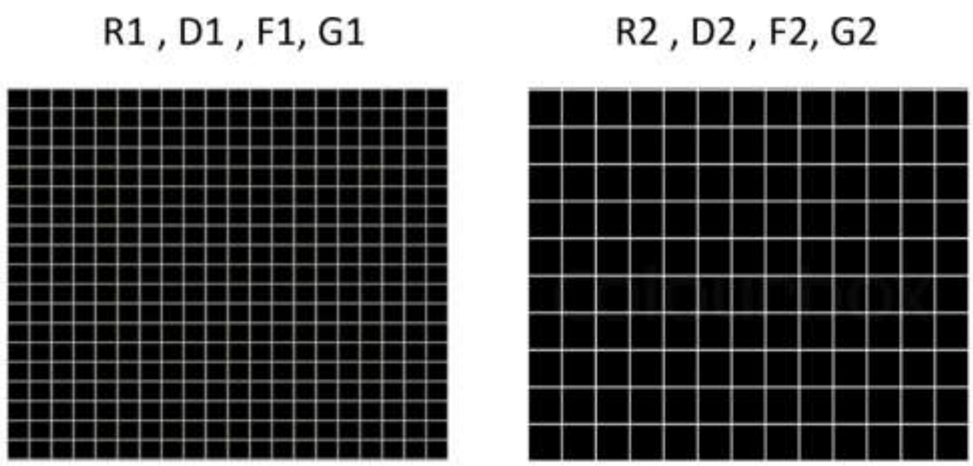

Figure 1: Illustration of the grid dimension where the white two dimensional (2D) grid structure illustrates the three dimensional (3D) hidden extra grid dimensions and the black rectangles illustrate the quantized units of space in the size of Planck length in each dimension. As the resolution of these space units R increases (illustrated on the left image by the decrease in the rectangle size), the density D of the grid dimension increases and the gravitational constant G

decreases and vice versa. In the figure above there are two illustrated grid dimensions with different grid densities where R1> R2, D1 > D2, F1 < F2 and G1 < G2.

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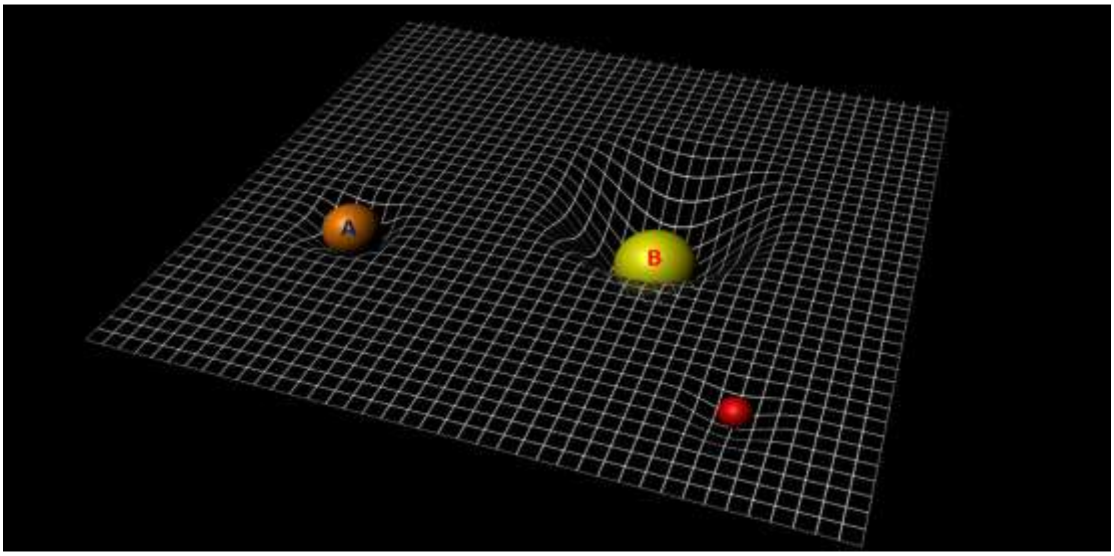

Figure 2: In the illustration above, the grid dimension is illustrated like a two dimensional white grid and the quantized units of space are illustrated by the black two dimensional rectangles which are defined by the grid. The flexibility of the grid defines the amount of mass and energy that is needed to curve it. An increase in the density of the grid dimension will decrease its flexibility to curve F and that leads to a decrease in the gravitational constant G. Assuming that for each quantized pulse of Planck time, light can travel one local quantized unit of Planck length, the speed limit for transferring energy from A to B is limited by the speed of light c. The non-locality of the grid dimension can explain non locality behavior of quantum mechanics like quantum entanglement and the Feynman path integral formulation [3]. The grid structure enables to stagger infinite quantized worlds together as suggested by the Everett many worlds interpretation [4] to the quantum measurement problem [5]. In the figure above the grid dimension is illustrated like a 2D grid of lines, but a more symmetrical approach leads to a model in which the quantized 3D units of space are shaped like bubbles, floating, rotating or vibrating in a "sea" of the 3D extra grid dimension.

REFERENCES:

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