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The Planck Relation is a Geometric Mean Equation

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ABSTRACT

We show that the Planck relation is a geometric mean equation, supporting the idea that the universe is undergoing a geometric mean expansion.

Subject headings: Planck relation; geometric mean expansion of space; Planck energy; Compton wavelength

1. Introduction

We highlight that the Planck relation is a geometric mean equation. This paper is a brief extract of one of the ideas presented in [1] and [2]. In those papers, we argued that the universe is the surface volume of a hollow, expanding, 4D hypersphere, termed the hyperverse. The mass of the universe is given in [1], and the initial energy of the universe, existing at the time the geometric mean expansion started, is presented in [2].

- The Planck relation is a geometric mean relation.
- The Compton wavelength equation is also a geometric mean relationship.
- This supports the idea that the universe is undergoing a geometric mean type of expansion.

2. Generating the Planck Relation from the Geometric Mean Expansion of Space

From the idea of the geometric mean expansion of space, we make the claim that the product of the energy of the observable universe, E_o, and the 'small energy' E_s, equals the initial energy squared.

$$E_o \times E_s = (E_{initial})^2 \qquad (1)$$

In [1] the energy of the observable universe, E_o, was shown to be:

$$E_o = \frac{R_H c^4}{4G} \qquad (2)$$

where R_H is the radius of the hyperverse

c is the speed of light

G is the gravitational constant

In [2], the initial energy, E_i, of the observable universe is given as one-half the Planck energy:

$$E_i = \frac{\sqrt{\frac{c^5\hbar}{G}}}{2} \qquad (3)$$

where $\hbar$ is the reduced Planck constant.

Substituting equations (2) and (3) into equation (1), and solving for E_s:

$$E_s = \frac{\left(\frac{E_p}{2}\right)^2}{\frac{R_H c^4}{4G}} = \frac{\left(\frac{\sqrt{\frac{c^5\hbar}{G}}}{2}\right)^2}{\frac{R_H c^4}{4G}} = \frac{c\hbar}{R_H} \qquad (4)$$

We find that the geometric mean counterpart of the energy of the observable universe gives a Planck relation:

$$E_s = \frac{c\hbar}{R_H} \qquad (5)$$

We can continue this idea, and show that the Compton wavelength equation is also a geometric mean relationship. By dividing both sides of equation (5) by c^2, we get the Compton relationship:

$$\frac{E_s}{c^2} = \frac{c\hbar}{c^2 R_H} \Rightarrow M_s = \frac{\hbar}{cR_H} \qquad (6)$$

These equations help support the idea that the universe is undergoing a geometric mean expansion.

References

1. Tassano, J. The Hubble Constant is a Measure of the Fractional Increase in the Energy of the Universe. viXra:1312.0044, 2013.

2. Tassano, J. “A Universe from Itself: The Geometric Mean Expansion of Space and the Creation of Quanta.” viXra:1312.0048, 2013