The Planckian Hierarchal Schematic

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Abstract

The construction of the Planckian hierarchal schematic, comprised of four very well-known Planck constants, i.e., h, ħ, lp and tp. The reintroduction of a forgotten constant, ½ħ. The postulation of a new Planck constant - the Planck circumference, symbol Ⓟ, where the Planck length is its diameter. The natural outcome of π as the ratio of the Planck length and Planck circumference. Also, the initialization of the ratio of ½ħ and the Planck circumference, Ⓟ, with a value of 1.038499006, referred to, as the ratio of attribute. The crux of this paper is to show that the dimensionless ratios of the Planckian schematic (i.e., 2, 1.038499006, π and c) can be utilized to enumerate the Planck momentum, Planck mass and the Planck energy constants.

Standard model (incomplete) **Planckian hierarchal schematic:**

(five well-known Planck constants in an hierarchal configuration)

(Planck constant) $6.626068909 \times 10^{-34}$ — h

(reduced Planck constant) $1.054571620 \times 10^{-34}$ — $\hbar \mid 2\pi$

(half reduced Planck constant) $5.272858101 \times 10^{-35}$ — $(\frac{1}{2}\hbar) \mid 2$

(Planck length) $1.616181480 \times 10^{-35}$ — l_p

(Planck time) $5.391001132 \times 10^{-44}$ — $t_p \mid c$

Proposed (complete) Planckian hierarchal schematic, with the postulated Planck circumference constant, symbol Ⓟ, and two respective ratios: π & 1.038499006.

(Planck constant) $6.626068909 \times 10^{-34}$ — h

(reduced Planck constant) $1.054571620 \times 10^{-34}$ — $\hbar \mid 2\pi$

(half reduced Planck constant) $5.272858101 \times 10^{-35}$ — $(\frac{1}{2}\hbar) \mid 2$

(Planck circumference*) $5.077383865 \times 10^{-35}$ — Ⓟ | 1.038499006

(Planck length) $1.616181480 \times 10^{-35}$ — $l_p \mid \pi$

(Planck time) $5.391001132 \times 10^{-44}$ — $t_p \mid c$

Half of the reduced Planck constant*, (½ħ) "The forgotten constant"*,** During the quantum revolution, Neils Bohr proposed that the reduced Planck constant, symbol ħ = h/2π, was the smallest attribute of a particle, .i.e., the quantization of its orbital angular momentum. Then, in 1925, physicists Sam Goudsmit and George Uhlenbech discovered that the electron also possessed spin angular momentum with a magnitude of half of the reduced Planck constant, symbol (½ħ). This gave Dirac the fourth quantum number to codify his equation. [4] Though, the importance of spin cannot be over-stated; It will be demonstrated that half of the reduced Planck constant (½ħ), is a crucial player (above and beyond its definition of spin) in the scheme of fundamental physics. It will be shown to have a prominent role in the hierarchical evolution of the constants. The National Institute of Standards and Technology (NIST) does not list half of the reduced Planck constant (½ħ).[1]

***π*,** In the thirty-five hundred years since its discovery, physicists have been unable to give π a definable function within the context of fundamental equations, albeit ubiquitous. The Planckian schematic shows the first π as a ratio in the hierarchal schematic.

First pi equation:

(Planck circumference, Ⓟ divided by the Planck length, lp)

$$\pi = \frac{Ⓟ}{lp}$$

Ratio of attribute

(half of the reduced Planck constant, ½ħ divided by the Planck circumference, Ⓟ)

$$\frac{(½)\hbar}{Ⓟ} = 1.038499006$$

Enumerated constants, via ratios of the Planckian hierarchal schematic:

Planck momentum

$$\text{MOp} = 2\left[\frac{(½)\hbar}{Ⓟ}\right]\pi = 6.52508$$

Planck mass

$$\text{mp} = \frac{2\left[\frac{(½)\hbar}{Ⓟ}\right]\pi}{c} = 2.176532972 \times 10^{-8}\ \text{kg}$$

(The speed of light, c, value: 299792458, utilized as a dimensionless constant)

Note: within the 2010 (NIST) CODATA value: $2.17651(13) \times 10^{-8}$ kg

The NIST lists the Planck mass equation (standard model) as: **$mp = (\hbar c/G)^{½}$** [1]

Planck energy

$$\text{Ep} = 2\left[\frac{(½)\hbar}{Ⓟ}\right]\pi c = 1.9561 \times 10^{9}$$

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half of reduced Planck constant

$$(½)\hbar = Ⓟ\left[\frac{(½)\hbar}{Ⓟ}\right] = 5.272858101 \times 10^{-35}$$

Reduced Planck constant (h-bar)

$$\hbar = 2\,℗\left[\frac{(½)\hbar}{℗}\right] = 1.054571619 \times 10^{-34}$$

Planck Constant

$$h = 4\pi\,℗\left[\frac{(½)\hbar}{℗}\right] = 6.626068909 \times 10^{-34}$$

Planck Temperature

$$T_p = \frac{2\left[\frac{(½)\hbar}{℗}\right]\pi c}{k} = 1.41684693 \times 10^{32}$$

where: $k = 1.38065048 \times 10^{-23}$ (Boltzmann constant)

Conclusion

The enumeration of the Planck – momentum, mass and energy, solely by the dimensionless constants of the Planckian hierarchal schematic: 2, 1.038499006, π and 299792458. (something that has never been done before)

References

[1]. NIST, Fundamental Physical Constants (2006 / 2010 / 2014)
[2]. Quantum Dance, Princeton.edu, Feb. 18, 2009
[3]. Kenneth W. Ford, The Quantum World, Harvard University Press, USA (2004)
[4] John D. Barrow, The Constants, Pantheon Books, USA (2002)