

# The Derivation of the Hertz-Kilogram Relationship Constant, via the Democritean Indivisible Particle/Unit, Y' and the Relative Ratios of the 13/12 Schematic

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## Abstract

The Hertz-kilogram relationship constant, although obscure, is nonetheless a bona fide constant listed in the National Institute of Standards and Technology's (Codata values) fundamental constants list. [pg 6] The Hertz-kilogram relationship constant is being used due to its value of  $(7.372497201 \times 10^{-51} (91))$  being very close to the Democritean indivisible unit, Y'  $(8.134865168 \times 10^{-54})$  It is shown that the 13/12 schematic of U-theory [2] theoretically calculates the fundamental constants within the uncertainty limits of (NIST) CODATA values [1]; utilizing twelve dimensionless constants.

## Discussion

*U-theory* – A fundamental particle / aggregate theory that espouses both The Pythagorean and Democritean philosophies of fundamental mathematics and physics. The Pythagorean view that “all is number”, that numbers are the order and harmony of the universe; that at its deepest level, reality is mathematical in nature. Another Pythagorean belief was that musical notes could be written as mathematical expressions. [3] It's interesting that the twelve ratios of 13/12 schematic, numerically correspond to the twelve notes of music, i.e., **A, A#, B, C, C#, D, D#, E, F, F#, G, G#**, coincidence? [2]. U-theory also espouses the Democritean atomist school of thought, whose central tenet is the belief that everything in creation is reducible to indivisible particles [4]. Democritus has been honored by naming the indivisible particle, the Democritean particle / unit. U-theory defines the universe as interactions of indivisible (Democritean) particles and aggregates of indivisible particles that comprise the universe. *Analogy: Think of all the sand grains of all the beaches on earth. Now imagine everything in the universe as sand sculptures, e.g., a sand castle comprised of a specific number of sand grains in a specific (castle) configuration; a boat with a specific number of sand grains in a specific (boat) configuration; a whale with a specific number of sand grains in a specific (whale) configuration, and so on. Now, the sand grains analogous to the Democritus's indivisible particles and the sand sculptures (aggregates of sand grains / Democritean units) as all possible entities in creation (also, fundamentally constants). So, the fundamental description of nature: everything in the universe can be defined as a specific number of Democritus's indivisible particles within a specific configuration, utilizing the dimensionless ratios of U-theory.*

U-theory posits a four tier universal system: 1) Democritean; 2) Planckian; 3) Atomic; 4) Macro

*Democritean indivisible particle / unit, Y'* - The postulated indivisible particle / unit fundamental building block of nature. Subject to the first principle of U-theory --- The fundamental indivisible building block would necessarily have the simultaneous dimensions of length, mass, temperature, speed, charge, magnetic moment, etc. Thought experiment: Let us say that a marble is the (blown-up) Democritean indivisible unit, Y'. In analysis, we find it has mass and arbitrarily measure it in kilograms, it has energy and measure it in joules; it has length and measure it in meters; it has charge and measure it in Coulombs, and so on. By virtue of being the fundamental unit, one can see how the various units can have the same numerical value. Therefore, exempt from dimensional analysis.

## Democritean indivisible particle / unit, Y' equation:

$$Y' = e * \pi * l_p$$

Alternate equation:

$$Y' = m_e \mu_B / [1/2 \hbar / \textcircled{P}]$$

$$\text{U-theory value: } 8.1348651681005514475463 \times 10^{-54}$$

where:  $e = 1.602176511 \times 10^{-19} \text{ C}$  (elementary charge)

$$\pi = 3.141592654 \text{ (pi)}$$

$$l_p = 1.616181480 \times 10^{-35} \text{ m}$$
 (Planck length)

$$m_e = 9.109382065 \times 10^{-31} \text{ kg}$$
 (electron rest mass)

$$\mu_B = 9.274009296 \times 10^{-26} \text{ J T}^{-1}$$
 (Bohr Magneton)

$$1/2 \hbar = \hbar/2 = h/4\pi = 5.272858101 \times 10^{-35} \text{ J s}$$
 (half of the reduced Planck constant)

$$\textcircled{P} = l_p * \pi = 5.077383865 \times 10^{-35} \text{ m}$$
 (Planck circumference)(new constant as the product of two very well-known constants, (Planck length times pi)

(Note: values within the accepted uncertainty limits set by NIST, CODATA.) [1]

### Hertz-Kilogram relationship (1 Hz) h/c<sup>2</sup>

NIST 2014 CODATA value: 7.372497201 (91) x10<sup>-51</sup> kg  
 NIST 2006 CODATA value: 7.37249600 (37) x10<sup>-51</sup> kg  
 U-theory value: 7.37249594 x10<sup>-51</sup> kg

(\* The proton mass and the mp/me ratio calculated 4% smaller as per 4% smaller proton charge rms radius)

	Proton mass*
m <sub>p</sub>	1.672503106 x10 <sup>-27</sup>
m <sub>p</sub> /m <sub>e</sub>	1836.022569*
	Electron mass
m <sub>e</sub>	9.109382065 x10 <sup>-31</sup>
α <sup>-1</sup>	137.0359996
	New Constant 4
NC <sub>4</sub>	6.647437236 <sup>-33</sup>
NCR <sub>3</sub>	10.03224887
	Planck constant
h	6.626068909 x10 <sup>-34</sup>
2π	6.283185307
	Red. Planck const.
ħ	1.054571620 x10 <sup>-34</sup>
2	2
	½ Red. Planck const.
½ħ	5.272858100 x10 <sup>-35</sup>
½ħ/Ⓟ	1.038499006
	Planck circumference
Ⓟ	5.077383865 x10 <sup>-35</sup>
π	3.141592654
	Planck length
l <sub>p</sub>	1.616181480 x10 <sup>-35</sup>
C	299792458
	Planck time
t <sub>p</sub>	5.391001321 x10 <sup>-44</sup>
C	299792458
	New constant 3
NC <sub>3</sub>	1.798244414 x10 <sup>-52</sup>
NCR <sub>2</sub>	10.5007114
	New constant 2
NC <sub>2</sub>	1.712497702 x10 <sup>-53</sup>
2	2
	New constant 1
NC <sub>1</sub>	8.562488511 x10 <sup>-54</sup>
NCR <sub>1</sub>	1.052566740
	Democritean unit
Y'	8.134865168 x10 <sup>-54</sup>

2π	
*	
2	
*	
1.038	
*	9
π	0
	6.
	2
	8
	3
*	7
	2
	9
	3
10.50	
*	
2	
*	
1.052	
*	
Y'	

= 7.37249594 x10<sup>-51</sup>

(1 Hz) h/c<sup>2</sup>, defined as the aggregate ratio of 906.2837293\*8.134865168x10<sup>-54</sup> (Democritean Indivisible Unit, Y') Note: The 2006 CODATA values are used. According to U-theory the uncertainty limits of the 2010 and 2014 are deemed incorrect. A comparative analysis shows a discrepancy between the 2014, 2006 values. (Outside the uncertainty limits)

Inverse fine structure,  $\alpha^{-1}$ 

NIST 2014 CODATA value: 137.035999139(31)

NIST 2006 CODATA value: 137.035999679(94)

U-theory value: 137.035999605

Symbol	Proton mass
$m_p$	$1.672503106 \times 10^{-27}$
$m_p/m_e$	1836.022569
	Electron mass
$m_e$	$9.109382065 \times 10^{-31}$
$\alpha^{-1}$	137.0359996
	New Constant 4
$NC_4$	$6.647437236^{-33}$
$NCR_3$	10.03224887
	Planck constant
$h$	$6.626068909 \times 10^{-34}$
$2\pi$	6.283185307
	Red. Planck const.
$\hbar$	$1.054571620 \times 10^{-34}$
2	2
	$\frac{1}{2}$ Red. Planck const.
$\frac{1}{2}\hbar$	$5.272858100 \times 10^{-35}$
$\frac{1}{2}\hbar/\textcircled{P}$	1.038499006
	Planck circumference
$\textcircled{P}$	$5.077383865 \times 10^{-35}$
$\pi$	3.141592654
	Planck length
$l_p$	$1.616181480 \times 10^{-35}$
$C$	299792458
	Planck time
$t_p$	$5.391001321 \times 10^{-44}$
$C$	299792458
	New constant 3
$NC_3$	$1.798244414 \times 10^{-52}$
$NCR_2$	10.5007114
	New constant 2
$NC_2$	$1.712497702 \times 10^{-53}$
2	2
	New constant 1
$NC_1$	$8.562488511 \times 10^{-54}$
$NCR_1$	1.05256674
	Democritean unit
$Y'$	$8.134865168 \times 10^{-54}$

2	
*	
1.038	
	1
*	3
$\pi$	7.
	0
	3
	5
	9
*	9
	9
	6
	0
10.50	5
*	
2	

 $= \alpha^{-1}$ 

$\alpha^{-1}$ , defined as the aggregate of five (above) of the twelve dimensionless constants of the 13/12 schematic. Note: The double value of  $\alpha^{-1}$  ( whole value between NC4 and  $m_e$ , and the aggregate value above) within the 13/12 schematic

**Note: The aggregate ratio produced by the 13/12 schematic, calculating the Hertz-kilogram relationship constant of 906.2837293, has the embedded value of the inverse fine structure constant, i.e., (see schematic above)**

$$906.2837293 / 2\pi = 144.2395354 / 1.05256674 (\text{NCR}_1) = 137.0359996 (\alpha^{-1})$$

$$(\alpha^{-1}) = 2 * 10.5007114 (\text{NCR}_2) * \pi * 1.038499006 (\frac{1}{2}\hbar/\text{P}) * 2 = 137.0359996$$

Alternate expression:

$$(\alpha^{-1}) = 4\pi * 10.500114 (\text{NCR}_2) * 1.038499006 (\frac{1}{2}\hbar/\text{P}) = 137.0359996$$

**(see schematics above)**

Attention should be given to the fact that in a number of equations the fine structure constant manifests a squared value, which mirrors the double value of the inverse fine structure constant (within the 13/12 schematic) aggregate value:  $[2*\pi, *10.5007114*1038499006*2]$  and the whole value, 137.0359996 [between  $m_e$  and  $\text{NC}_4$ ] within the 13/12 schematic. (see the inverse fine structure schematic above)

**Examples of squared fine structure constant equations:**

$$\text{Rydberg constant, } R_\infty \\ \alpha^2 m_e c / 2h$$

$$\text{Hartree energy, } E_h \\ \alpha^2 m_e c^2$$

The NIST Reference on  
Constants, Units, and Uncertainty

Fundamental Physical Constants

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**hertz-kilogram relationship**

$$(1 \text{ Hz})h/c^2$$

Value  $7.372\ 497\ 201 \times 10^{-51} \text{ kg}$

Standard uncertainty  $0.000\ 000\ 091 \times 10^{-51} \text{ kg}$

Relative standard uncertainty  $1.2 \times 10^{-8}$

Concise form  $7.372\ 497\ 201(91) \times 10^{-51} \text{ kg}$

Click [here](#) for **correlation coefficient** of this constant with other constants

[Source: 2014 CODATA  
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## Conclusion

If the math doesn't work, throw it in the garbage. If the math works, an investigation is warranted.

## References

- [1] National Institute of Standards and Technology (2006, '10, '14, CODATA values)
- [2] Vito R. D'Angelo, Vixra: 1607.0172 (2016-7-14)
- [3] Philip, James A. Pythagoras and early Pythagoreanism, University of Toronto Press, 1966
- [4] Espen G. Haug, United Revolution, E.G.H., Publishing, As, Norway (2014)