

# Musical Chairs of the Constants

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## Abstract

It is demonstrated that constants (and groupings of constants) are ratios, with theoretically inherent exact values. Based on the exact value of the speed of light in vacuum, as defined by the National Institute of Standards and Technology, CODATA value: 299792458.

(Thirty digit calculation required using U-theory values below, within 2006 CODATA values)

**Note: All six equations have the same constants in a cyclic pattern.**

$$c = \frac{2R_{\infty}(\alpha^{-1})^2 h}{m_e} \quad 2 = \frac{m_e c}{R_{\infty}(\alpha^{-1})^2 h} \quad R_{\infty} = \frac{m_e c}{2(\alpha^{-1})^2 h}$$
$$m_e = \frac{2R_{\infty}(\alpha^{-1})^2 h}{c} \quad (\alpha^{-1})^2 = \frac{2R_{\infty} h}{m_e c} \quad h = \frac{m_e c}{2R_{\infty}(\alpha^{-1})^2}$$

where:  $c = 299792458 \text{ m s}^{-1}$  (speed of light in vacuum, exact value by definition)

$2 = 2$

$R_{\infty} = 10973731.5685479918130\dots \text{ m}^{-1}$  (Rydberg constant) (rational value/terminating decimal)

$m_e = 9.109382065421603925212576191207 \times 10^{-31} \text{ kg}$  (electron mass) (irrational value)

$(\alpha^{-1})^2 = 18778.865187780\dots$  (inverse fine structure squared) (rational value/terminating decimal)

$h = 6.626068909260008685061478079837 \times 10^{-34} \text{ J s}$  (Planck constant) (irrational value)

## **Discussion**

All constants, as is the speed of light value, defined as ratios, e.g., in the equation:  $E=mc^2$ ,  $c^2$  does not represent a speed, but a ratio between mass and energy.

The 2010 and 2014 CODATA values were not used. Based on results of U-theory calculations, some of the 2010 and 2014 are deemed incorrect within the uncertainty limits. The 2006 CODATA values are correct.

## **Conclusion**

The results of the above equations could not have been achieved without unprecedented accuracy of the aforementioned constants values. If the math works, an investigation is warranted. The reader is challenged to perform the math.

## **References**

National Institute of Standards and Technology (2006 CODATA values)

National Institute of Standards and Technology (2010 CODATA values)

National Institute of Standards and Technology (2014 CODATA values)

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