

The natural constants c , G , and h are only conversion factors of time, length, and mass.

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In his book “The Constants of Nature” (2002) John Barrow emphasized, that these numbers “encode the deepest secrets of the universe”. But as we know, in 1899 Max Planck has found, that in principle the fundamental constants c (speed of all electromagnetic waves in vacuum), G (Newtons gravitational constant) or $\hbar = \text{Planck constant } h/2\pi$, can be normalized to one ($c = G = \hbar = 1$), if we use the natural units, as Planck coined them, or the reduced Planck units. That means, that there is no deep secret behind the values of our natural constants

$$c = 2.9979 \cdot 10^8 \text{ [m /sec]}$$

$$G = 6.6724 \cdot 10^{-11} \text{ [m}^3 \text{ / kg s}^2\text{]}$$

$$\hbar = 1.0546 \cdot 10^{-34} \text{ [kg m}^2 \text{ / s]}$$

They are only artifacts of our MKS-system. The real mystery behind these constants is, that they are constant relations between time, length and mass, because time, space and energy is a continuum. Thus, it is very misleading, to measure time, length, and mass on such anthropocentric scales like meter, kilogram or second.

$$\text{Planck time } Pt = (\hbar G / c^5)^{0.5} = 5.3905 \cdot 10^{-44} \text{ [s]}$$

$$\text{Planck length } Pl = (\hbar G / c^3)^{0.5} = 1.6160 \cdot 10^{-35} \text{ [m]}$$

$$\text{Planck mass } Pm = (\hbar c / G)^{0.5} = 2.1767 \cdot 10^{-8} \text{ [kg]}$$

they all show us, how distorted our world view is. For human beings, a second is a short time, but it seems, that our universe is roughly

$8 \cdot 10^{60}$ Planck times old (13.7 billion years), has a radius of

$8 \cdot 10^{60}$ Planck length ($1.3 \cdot 10^{26}$ m), and an energy of

$8 \cdot 10^{60}$ Planck mass ($1.7 \cdot 10^{53}$ kg – 1 Planck energy = 1 Planck mass).

Using the Planck units, it is remarkable that for atoms we repeatedly get the dimensionless fine-structure constant α , found by A. Sommerfeld 1916.

It is the charge of the electron

$$\alpha = e^2$$

The speed of electrons at the Bohr circle

$$\alpha = ve$$

The mass of the electron multiplied by the radius of the electron

$$\alpha = me \times re$$

The mass of the proton multiplied by the radius of the proton

$$\alpha = mp \times rp$$

The inverse relation of the electron mass multiplied by the Bohr radius

$$\alpha = 1 / (me \times rB)$$

The square root of electron radius divided by the Bohr radius

$$\alpha = (re / rB)^{0.5}$$

Isn't that remarkable?