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Planck units (geometrical)

Natural Planck units as geometrical objects (the mathematical electron model)

In a geometrical Planck unit theory, the dimensioned universe at the Planck scale is defined by discrete geometrical objects for the Planck units; Planck mass, Planck length, Planck time and Planck charge. The object embeds the attribute (mass, length, time, charge) of the unit, whereas for numerical based constants, the numerical values are dimensionless frequencies of the SI unit (kg, m, s, A), 3kg refers to 3 of the unit kg, the number 3 carries no mass-specific information.

Geometrical objects

The mathematical electron [1] is a Planck unit model where mass M, length L, time T, and ampere A are each assigned discrete geometrical objects from the geometry of 2 dimensionless physical constants, the (inverse) fine structure constant **α** and Omega **Ω**. Embedded into each object is the object function (attribute).

Table 1. Geometrical units

Attribute	Geometrical object
mass	$M = (1)$
time	$T = (\pi)$
sqrt(momentum)	$P = (\Omega)$
velocity	$V = (2\pi\Omega^2)$
length	$L = (2\pi^2\Omega^2)$
ampere	$A = \frac{16V^3}{\alpha P^3} = (\frac{2^7\pi^3\Omega^3}{\alpha})$

As the geometries of dimensionless constants, these objects are also dimensionless and so are independent of any system of units, and of any numerical system, and so could qualify as "natural units" (naturally occuring units);

> *...ihre Bedeutung für alle Zeiten und für alle, auch außerirdische und außermenschliche Kulturen notwendig behalten und welche daher als »natürliche Maßeinheiten« bezeichnet werden können...*
>
> ...These necessarily retain their meaning for all times and for all civilizations, even extraterrestrial and non-human ones, and can therefore be designated as "natural units"... -Max Planck [2][3]

As geometrical objects, they may combine Lego-style to form more complex objects such as electrons (i.e.: by embedding *mass* and *ampere* objects into the geometry of the electron (the electron object), the electron can have wavelength and charge) [4]. This requires a mathematical (unit number) relationship that defines how the objects interact with each other.

Table 2. Unit number

Attribute	Object	Unit number θ
mass	$M = (1)$	15
time	$T = (\pi)$	-30
sqrt(momentum)	$P = (\Omega)$	16
velocity	$V = (2\pi\Omega^2)$	17
length	$L = (2\pi^2\Omega^2)$	-13
ampere	$A = \frac{16V^3}{\alpha P^3} = (\frac{2^7\pi^3\Omega^3}{\alpha})$	3

As alpha (α = 137.035 999 084) and Omega (Ω = 2.007 134 949 636) both have numerical solutions, we can assign to MLTA numerical values, i.e.: $V = 2\pi\Omega^2 = 25.3123819$ and use to solve geometrical physical constant equivalents.

Table 3. Physical constant equivalents

CODATA 2014 [5]	SI unit	Geometrical constant	unit u^θ
c = 299 792 458 (exact)	$\frac{m}{s}$	*c** = V = 25.312381933	u^{17}
h = 6.626 070 040(81) e-34	$\frac{kg\ m^2}{s}$	$h^* = 2\pi MVL$ = 12647.2403	$u^{15+17-13} = u^{19}$
G = 6.674 08(31) e-11	$\frac{m^3}{kg\ s^2}$	$G^* = \frac{V^2L}{M}$ = 50950.55478	$u^{34-13-15} = u^6$
e = 1.602 176 620 8(98) e-19	$C = As$	$e^* = AT$ = 735.70635849	$u^{3-30} = u^{-27}$
k_B = 1.380 648 52(79) e-23	$\frac{kg\ m^2}{s^2\ K}$	$k_B{}^* = \frac{2\pi VM}{A}$ = 0.679138336	$u^{17+15-3} = u^{29}$

We then find that where the unit numbers cancel, the numerical solutions agree (see Table 8).

Table 4. Dimensionless combinations

CODATA 2014 (mean)	(α, Ω)	units $u^\theta = 1$
$\frac{k_B ec}{h} = 1.000\ 8254$	$\frac{(k_B^*)(e^*)(c^*)}{(h^*)} = 1.0$	$\frac{(u^{29})(u^{-27})(u^{17})}{(u^{19})} = 1$
$\frac{h^3}{e^{13}c^{24}} = 0.228\ 473\ 639...\ 10^{-58}$	$\frac{(h^*)^3}{(e^*)^{13}(c^*)^{24}} = \frac{\alpha^{13}}{2^{106}\pi^{64}(\Omega^{15})^5} = 0.228\ 473\ 759...\ 10^{-58}$	$\frac{(u^{19})^3}{(u^{-27})^{13}(u^{17})^{24}} = 1$
$\frac{hc^2em_p}{G^2k_B} = 3.376\ 716$	$\frac{(h^*)(c^*)^2(e^*)M}{(G^*)^2(k_B^*)} = \frac{2^{11}\pi^3}{\alpha^2} = 3.381\ 506$	$\frac{(u^{19})(u^{17})^2(u^{-27})(u^{15})}{(u^6)^2(u^{29})} = 1$

Scalars

To translate from geometrical objects to a numerical system of units requires system dependent scalars (**kltpva**). For example;

> If we use *k* to convert *M* to the SI Planck mass ($M{*}k_{SI} = m_P$), then k_{SI} = 0.2176728e-7kg (SI units)
>
> Using v_{SI} = 11843707.905m/s gives $c = V{*}v_{SI}$ = 299792458m/s (SI units)

Using v_{imp} = 7359.3232155miles/s gives c = V*v_{imp} = 186282miles/s (imperial units)

Table 5. Geometrical units

Attribute	Geometrical object	Scalar	Unit u^θ
mass	$M = (1)$	*k*	u^{15}
time	$T = (\pi)$	*t*	u^{-30}
sqrt(momentum)	$P = (\Omega)$	r^2	u^{16}
velocity	$V = (2\pi\Omega^2)$	*v*	u^{17}
length	$L = (2\pi^2\Omega^2)$	*l*	u^{-13}
ampere	$A = (\frac{2^7\pi^3\Omega^3}{\alpha})$	*a*	u^3

Scalar relationships

Because the scalars also include the SI unit, v = 11843707.905**m/s** ... they follow the unit number relationship u^θ. This means that we can find ratios where the scalars cancel. Here are examples (units = 1), as such *only 2 scalars are required*, for example, if we know the numerical value for *a* and for *l* then we know the numerical value for *t* (**t = a^3l^3**), and from *l* and *t* we know the value for *k*.

$$\frac{u^{3*3}u^{-13*3}}{u^{-30}}\ (\frac{a^3l^3}{t}) = \frac{u^{-13*15}}{u^{15*9}u^{-30*11}}\ (\frac{l^{15}}{k^9t^{11}}) = \ldots = 1$$

This means that once any 2 scalars have been assigned values, the other scalars are then defined by default, consequently the CODATA 2014 values are used here as only 2 constants (c, μ_0) are assigned exact values, following the 2019 redefinition of SI base units 4 constants have been independently assigned exact values which is problematic in terms of this model.

Scalars r (θ = 8) and v (θ = 17) are chosen as they can be derived directly from the 2 constants with exact values; c and μ_0.

$$v = \frac{c}{2\pi\Omega^2} = 11843707.905...,\ units = \frac{m}{s}$$

$$r^7 = \frac{2^{11}\pi^5\Omega^4\mu_0}{\alpha};\ r = 0.712562514304...,\ units = (\frac{kg.m}{s})^{1/4}$$

Table 6. Geometrical objects

attribute	geometrical object	unit number θ	scalar r(8), v(17)
mass	$M = (1)$	15 = 8*4-17	$k = \frac{r^4}{v}$
time	$T = (\pi)$	-30 = 8*9-17*6	$t = \frac{r^9}{v^6}$
velocity	$V = (2\pi\Omega^2)$	17	v
length	$L = (2\pi^2\Omega^2)$	-13 = 8*9-17*5	$l = \frac{r^9}{v^5}$
ampere	$A = (\frac{2^7\pi^3\Omega^3}{\alpha})$	3 = 17*3-8*6	$a = \frac{v^3}{r^6}$

Table 7. Comparison; SI and θ

constant	θ (SI unit)	MLTVA	scalar r(8), v(17)
c	$\frac{m}{s}$ (-13+30 = 17)	$c^* = V * v$	17
h	$\frac{kg\ m^2}{s}$ (15-26+30=19)	$h^* = 2\pi MVL * \frac{r^{13}}{v^5}$	8*13-17*5=19
G	$\frac{m^3}{kg\ s^2}$ (-39-15+60=6)	$G^* = \frac{V^2 L}{M} * \frac{r^5}{v^2}$	8*5-17*2=6
e	$C = As$ (3-30=-27)	$e^* = AT * \frac{r^3}{v^3}$	8*3-17*3=-27
k_B	$\frac{kg\ m^2}{s^2\ K}$ (15-26+60-20=29)	$k_B^* = \frac{2\pi VM}{A} * \frac{r^{10}}{v^3}$	8*10-17*3=29
μ_0	$\frac{kg\ m}{s^2\ A^2}$ (15-13+60-6=56)	$\mu_0^* = \frac{4\pi V^2 M}{\alpha L A^2} * r^7$	8*7=56

Fine structure constant

The fine structure constant can be derived from this formula (units and scalars cancel).

$$\frac{2(h^*)}{(\mu_0^*)(e^*)^2(c^*)} = 2(2^3\pi^4\Omega^4)/(\frac{\alpha}{2^{11}\pi^5\Omega^4})(\frac{2^7\pi^4\Omega^3}{\alpha})^2(2\pi\Omega^2) = \alpha$$

$$units\ \frac{u^{19}}{u^{56}(u^{-27})^2 u^{17}} = 1$$

$$scalars\ (\frac{r^{13}}{v^5})(\frac{1}{r^7})(\frac{v^6}{r^6})(\frac{1}{v}) = 1$$

Electron formula

Main resource: Electron (mathematical)

The *electron object* (formula ψ) *is a mathematical particle (units and scalars cancel).*

$$\psi = 4\pi^2(2^6 3\pi^2 \alpha\Omega^5)^3 = .23895453...x10^{23} \text{ units = 1}$$

In this example, embedded within the electron are the objects for charge, length and time ALT. AL as an ampere-meter (ampere-length) are the units for a magnetic monopole.

$$T = \pi\frac{r^9}{v^6},\ u^{-30}$$

$$\sigma_e = \frac{3\alpha^2 AL}{2\pi^2} = 2^7 3\pi^3 \alpha\Omega^5 \frac{r^3}{v^2},\ u^{-10}$$

$$\psi = \frac{\sigma_e^3}{2T} = \frac{(2^7 3\pi^3 \alpha\Omega^5)^3}{2\pi},\ units = \frac{(u^{-10})^3}{u^{-30}} = 1, scalars = (\frac{r^3}{v^2})^3 \frac{v^6}{r^9} = 1$$

Associated with the electron are dimensioned parameters, these parameters however are a function of the MLTA units, the formula ψ dictating the frequency of these units. By setting MLTA to their SI Planck unit equivalents (Table 6.);

electron mass $m_e^* = \frac{M}{\psi}$ (M = Planck mass = $\frac{r^4}{v}$) = 0.910 938 232 11 e-30

electron wavelength $\lambda_e^* = 2\pi L\psi$ (L = Planck length = $2\pi\Omega^2 \frac{r^9}{v^5}$) = 0.242 631 023 86 e-11

elementary charge $e^* = A\ T$ (T = Planck time) = $\frac{2^7\pi^4\Omega^3}{\alpha}\frac{r^3}{v^3}$ = 0.160 217 651 30 e-18

Rydberg constant $R^* = (\frac{m_e}{4\pi L\alpha^2 M}) = \frac{1}{2^{23}3^3\pi^{11}\alpha^5\Omega^{17}}\frac{v^5}{r^9}\ u^{13}$ = 10 973 731.568 508

Omega

The most precise of the experimentally measured constants is the Rydberg constant R = 10973731.568508(65) 1/m. Here c (exact), Vacuum permeability $\mu_0 = 4\pi/10$^7 (exact) and R (12-13 digits) are combined into a unit-less ratio;

$$\mu_0^* = \frac{4\pi V^2 M}{\alpha L A^2} = \frac{\alpha}{2^{11}\pi^5\Omega^4}r^7,\ u^{56}$$

$$R^* = (\frac{m_e}{4\pi L\alpha^2 M}) = \frac{1}{2^{23}3^3\pi^{11}\alpha^5\Omega^{17}}\frac{v^5}{r^9},\ u^{13}$$

$$\frac{(c^*)^{35}}{(\mu_0^*)^9(R^*)^7} = (2\pi\Omega^2)^{35}/(\frac{\alpha}{2^{11}\pi^5\Omega^4})^9 \cdot (\frac{1}{2^{23}3^3\pi^{11}\alpha^5\Omega^{17}})^7,\ units = \frac{(u^{17})^{35}}{(u^{56})^9(u^{13})^7}$$

$$\frac{(c^*)^{35}}{(\mu_0^*)^9(R^*)^7} = 2^{295}\pi^{157}3^{21}\alpha^{26}(\Omega^{15})^{15}, \text{ units = 1}$$

We can now define Ω using the geometries for (c^*, $\mu_0{}^*$, R^*) and then solve by replacing (c^*, $\mu_0{}^*$, R^*) with the numerical (c, μ_0, R).

$$\Omega^{225} = \frac{(c^*)^{35}}{2^{295}3^{21}\pi^{157}(\mu_0^*)^9(R^*)^7\alpha^{26}},\ units = 1$$

$\Omega = 2.007\ 134\ 949\ 636...,\ units = 1$ (CODATA 2014 mean values)

$\Omega = 2.007\ 134\ 949\ 687...,\ units = 1$ (CODATA 2018 mean values)

There is a close natural number for Ω that is a square root implying that Ω can have a plus or a minus solution, and this agrees with theory (in the mass domain Ω occurs as Ω^2 = plus only, in the charge domain Ω occurs as Ω^3 = can be plus or minus; see sqrt(momentum)). This solution would however re-classify Omega as a mathematical constant (as being derivable from other mathematical constants).

$$\Omega = \sqrt{\left(\pi^e e^{(1-e)}\right)} = 2.007\ 134\ 9543...$$

Using this Omega and reversing the above formula solves α = 137.035996376

We may also consider Euler's_formula where *i* is the imaginary unit.

$$e^{ix} = \cos x + i \sin x$$

Adding *i*

$$\sqrt{\left(i\pi^e e^{(1-e)}\right)}$$

Solves to 1.4192587369597 + 1.4192587369597*i*.

Dimensionless combinations

Reference List of dimensionless combinations. These can be solved using only α, Ω (and the mathematical constants 2, 3, π) as the units and scalars have cancelled. The precision of the results depends on the precision of the SI constants; combinations with G and k_B return the least precise values. These combinations can be used to test the veracity of the MLTA geometries as natural Planck units. See also Anomalies (below).

Example

$$\frac{(h^*)^3}{(e^*)^{13}(c^*)^{24}} = (2^3\pi^4\Omega^4\frac{r^{13}}{v^5})^3/(\frac{2^7\pi^4\Omega^3r^3}{\alpha v^3})^7.(2\pi\Omega^2v)^{24} = \frac{\alpha^{13}}{2^{106}\pi^{64}(\Omega^{15})^5} = \mathbf{0.228\ 473\ 759...\ 10^{-58}}$$

Note: the geometry $(\Omega^{15})^n$ (integer n ≥ 0) is common to all ratios where units and scalars cancel, suggesting a geometrical base-15.

Table 8. Dimensionless combinations

CODATA 2014 mean	(α, Ω) mean	units = 1	scalars = 1
$\frac{k_B e c}{h} = $ 1.000 8254	$\frac{(k_B^*)(e^*)(c^*)}{(h^*)}$ = 1.0	$\frac{(u^{29})(u^{-27})(u^{17})}{(u^{19})} = 1$	$(\frac{r^{10}}{v^3})(\frac{r^3}{v^3})(v)/(\frac{r^{13}}{v^5}) = 1$
$\frac{h^3}{e^{13}c^{24}} =$ 0.228 473 639... 10^{-58}	$\frac{(h^*)^3}{(e^*)^{13}(c^*)^{24}} = \frac{\alpha^{13}}{2^{106}\pi^{64}(\Omega^{15})^5} =$ 0.228 473 759... 10^{-58}	$\frac{(u^{19})^3}{(u^{-27})^{13}(u^{17})^{24}} = 1$	$(\frac{r^{13}}{v^5})^3/(\frac{r^3}{v^3})^{13}(v^{24}) = 1$
$\frac{c^{35}}{\mu_0^9 R^7} =$ 0.326 103 528 6170... 10^{301}	$\frac{(c^*)^{35}}{(\mu_0^*)^9(R^*)^7} = 2^{295}\pi^{157}3^{21}\alpha^{26}(\Omega^{15})^{15} =$ 0.326 103 528 6170... 10^{301}	$\frac{(u^{17})^{35}}{(u^{56})^9(u^{13})^7} = 1$	$(v^{35})/(r^7)^9(\frac{v^5}{r^9})^7 = 1$
$\frac{c^9 e^4}{m_e^3} =$ 0.170 514 342... 10^{92}	$\frac{(c^*)^9(e^*)^4}{(m_e^*)^3} = 2^{97}\pi^{49}3^9\alpha^5(\Omega^{15})^5 =$ 0.170 514 368... 10^{92}	$\frac{(u^{29})(u^{-27})(u^{17})}{(u^{19})} = 1$	$(v^9)(\frac{r^3}{v^3})^4/(\frac{r^4}{v})^3 = 1$
$\frac{k_B}{e^2 m_e c^4} =$ 73 095 507 858.	$\frac{(k_B^*)}{(e^*)^2(m_e^*)(c^*)^4} = \frac{3^3\alpha^6}{2^3\pi^5} =$ 73 035 235 897.	$\frac{(u^{29})}{(u^{-27})^2(u^{15})(u^{17})^4} = 1$	$(\frac{r^{10}}{v^3})/(\frac{r^3}{v^3})^2(\frac{r^4}{v})(v)^4 = 1$
$\frac{hc^2 e m_p}{G^2 k_B} =$ 3.376 716	$\frac{(h^*)(c^*)^2(e^*)(m_p^*)}{(G^*)^2(k_B^*)} = \frac{2^{11}\pi^3}{\alpha^2} =$ 3.381 506	$\frac{(u^{19})(u^{17})^2(u^{-27})(u^{15})}{(u^6)^2(u^{29})} = 1$	$(\frac{r^{13}}{v^5})v^2(\frac{r^3}{v^3})(\frac{r^4}{v^1})/(\frac{r^5}{v^2})^2(\frac{r^{10}}{v^3}) = 1$

Table of Constants

We can construct a table of constants using these 3 geometries. Setting

$$f(x)\ units = (\frac{L^{15}}{M^9 T^{11}})^n = 1$$

i.e.: unit number θ = (-13*15) - (15*9) - (-30*11) = 0

$i = \pi^2\Omega^{15}$, units = $\sqrt{f(x)}$ = 1 (unit number = 0, no scalars)

$x = \Omega\frac{v}{r^2}$, units = $\sqrt{\frac{L}{MT}}$ = u^1 = u (unit number = -13 -15 +30 = 2/2 = 1, with scalars *v*, *r*)

$y = \pi\frac{r^{17}}{v^8}$, units = $M^2 T$ = 1, (unit number = 15*2 -30 = 0, with scalars *v*, *r*)

Note: The following suggests a numerical boundary to the values the SI constants can have.

$\frac{v}{r^2} = a^{1/3} = \frac{1}{t^{2/15}k^{1/5}} = \frac{\sqrt{v}}{\sqrt{k}}$ ... = 23326079.1...; unit = u

$$\frac{r^{17}}{v^8} = k^2 t = \frac{k^{17/4}}{v^{15/4}} = \ldots$$ gives a range from 0.812997... x10^{-59} to 0.123... x10^{60}

Note: Influence of $f(x)$, units = 1

$$\frac{r^{17}}{v^8} \;\; units \; (\frac{M^2 L^8}{T^7})(\frac{T}{L})^8 = M^2 T$$

$$r^{17} \;\; units \; (\frac{M \; L}{T})^{17/4} f x^{1/4} = \frac{M^2 \; L^8}{T^7}$$

$$r \;\; units \; (\frac{M \; L}{T})^{1/4} f x^{1/4} = \frac{L^4}{M^2 T^3}$$

Table 9. Table of Constants

Constant	θ	Geometrical object (α, Ω, v, r)	Unit	Calculated	CODATA 2014
Time (Planck)	−30	$T = \frac{x^\theta i^2}{y^3} = \frac{\pi r^9}{v^6}$	T	T = 5.390 517 866 e-44	t_p = 5.391 247(60) e-44
Elementary charge	−27	$e^* = (\frac{2^7 \pi^3}{\alpha}) \frac{x^\theta i^2}{y^3} = (\frac{2^7 \pi^3}{\alpha}) \frac{\pi \Omega^3 r^3}{v^3}$	$\frac{L^{3/2}}{T^{1/2} M^{3/2}} = AT$	e^* = 1.602 176 511 30 e-19	e = 1.602 176 620 8(98) e-19
Length (Planck)	−13	$L = (2\pi) \frac{x^\theta i}{y} = (2\pi) \; \frac{\pi \Omega^2 r^9}{v^5}$	L	L = 0.161 603 660 096 e-34	l_p = 0.161 622 9(38) e-34
Ampere	3	$A = (\frac{2^7 \pi^3}{\alpha}) x^\theta = (\frac{2^7 \pi^3}{\alpha}) \; \frac{\Omega^3 v^3}{r^6}$	$A = \frac{L^{3/2}}{M^{3/2} T^{3/2}}$	A = 0.297 221 e25	e/t_p = 0.297 181 e25
Gravitational constant	6	$G^* = (2^3 \pi^3) x^\theta y = (2^3 \pi^3) \; \frac{\pi \Omega^6 r^5}{v^2}$	$\frac{L^3}{M T^2}$	G^* = 6.672 497 192 29 e11	G = 6.674 08(31) e-11
	8	$X = (2^4 \pi^4) x^\theta y = (2^4 \pi^4) \pi \Omega^8 r$	$\frac{L^4}{M^2 T^3}$	X = 918 977.554 22	
Mass (Planck)	15	$M = \frac{x^\theta y^2}{i} = \frac{r^4}{v}$	M	M = .217 672 817 580 e-7	m_P = .217 647 0(51) e-7
sqrt(momentum)	16	$P = \frac{x^\theta y^2}{i} = \Omega r^2$	$\frac{M^{1/2} L^{1/2}}{T^{1/2}}$		
Velocity	17	$V = (2\pi) \frac{x^\theta y^2}{i} = (2\pi) \; \Omega^2 v$	$V = \frac{L}{T}$	V = 299 792 458	c = 299 792 458
Planck constant	19	$h^* = (2^3 \pi^3) \frac{x^\theta y^3}{i} = (2^3 \pi^3) \; \frac{\pi \Omega^4 r^{13}}{v^5}$	$\frac{L^2 M}{T}$	h^* = 6.626 069 134 e-34	h = 6.626 070 040(81) e-34
Planck temperature	20	$T_p{}^* = (\frac{2^7 \pi^3}{\alpha}) \frac{x^\theta y^2}{i} = (\frac{2^7 \pi^3}{\alpha}) \; \frac{\Omega^5 v^4}{r^6}$	$\frac{L^{5/2}}{M^{3/2} T^{5/2}} = AV$	$T_p{}^*$ = 1.418 145 219 e32	T_p = 1.416 784(16) e32
Boltzmann constant	29	$k_B{}^* = (\frac{\alpha}{2^5 \pi}) \frac{x^\theta y^4}{i^2} = (\frac{\alpha}{2^5 \pi}) \; \frac{r^{10}}{\Omega v^3}$	$\frac{M^{5/2} T^{1/2}}{L^{1/2}} = \frac{ML}{TA}$	$k_B{}^*$ = 1.379 510 147 52 e-23	k_B = 1.380 648 52(79) e-23
Vacuum permeability	56	$\mu_0{}^* = (\frac{\alpha}{2^{11} \pi^4}) \frac{x^\theta y^7}{i^4} = (\frac{\alpha}{2^{11} \pi^4}) \; \frac{r^7}{\pi \Omega^4}$	$\frac{M \; L}{T^2 A^2}$	$\mu_0{}^*$ = 4π/10^7	μ_0 = 4π/10^7

From the perspective of geometries

note: $(u^{15})^n$ constants have no Omega term.

Table 10. Dimensioned constants; geometrical vs CODATA 2014

Constant	In Planck units	Geometrical object	SI calculated (r, v, Ω, α*)	SI CODATA 2014 [6]
Speed of light	V	$c^* = (2\pi\Omega^2)v,\ u^{17}$	c^* = 299 792 458, unit = u^{17}	c = 299 792 458 (exact)
Fine structure constant			α^* = 137.035 999 139 (mean)	α = 137.035 999 139(31)
Rydberg constant	$R^* = (\frac{m_e}{4\pi L\alpha^2 M})$	$R^* = \frac{1}{2^{23}3^3\pi^{11}\alpha^5\Omega^{17}}\frac{v^5}{r^9},\ u^{13}$	R^* = 10 973 731.568 508, unit = u^{13}	R = 10 973 731.568 508(65)
Vacuum permeability	$\mu_0^* = \frac{4\pi V^2 M}{\alpha L A^2}$	$\mu_0^* = \frac{\alpha}{2^{11}\pi^5\Omega^4}r^7,\ u^{56}$	μ_0^* = 4π/10^7, unit = u^{56}	μ_0 = 4π/10^7 (exact)
Vacuum permittivity	$\epsilon_0^* = \frac{1}{\mu_0^*(c^*)^2}$	$\epsilon_0^* = \frac{2^9\pi^3}{\alpha}\frac{1}{r^7v^2},\ 1/(u^{15})^6 = u^{-90}$		
Planck constant	$h^* = 2\pi MVL$	$h^* = 2^3\pi^4\Omega^4\frac{r^{13}}{v^5},\ u^{19}$	h^* = 6.626 069 134 e-34, unit = u^{19}	h = 6.626 070 040(81) e-34
Gravitational constant	$G^* = \frac{V^2 L}{M}$	$G^* = 2^3\pi^4\Omega^6\frac{r^5}{v^2},\ u^6$	G^* = 6.672 497 192 29 e11, unit = u^6	G = 6.674 08(31) e-11
Elementary charge	$e^* = AT$	$e^* = \frac{2^7\pi^4\Omega^3}{\alpha}\frac{r^3}{v^3},\ u^{-27}$	e^* = 1.602 176 511 30 e-19, unit = u^{-27}	e = 1.602 176 620 8(98) e-19
Boltzmann constant	$k_B^* = \frac{2\pi VM}{A}$	$k_B^* = \frac{\alpha}{2^5\pi\Omega}\frac{r^{10}}{v^3},\ u^{29}$	k_B^* = 1.379 510 147 52 e-23, unit = u^{29}	k_B = 1.380 648 52(79) e-23
Electron mass		$m_e^* = \frac{M}{\psi},\ u^{15}$	m_e^* = 9.109 382 312 56 e-31, unit = u^{15}	m_e = 9.109 383 56(11) e-31
Classical electron radius		$\lambda_e^* = 2\pi L\psi,\ u^{-13}$	λ_e^* = 2.426 310 2366 e-12, unit = u^{-13}	λ_e = 2.426 310 236 7(11) e-12
Planck temperature	$T_p^* = \frac{AV}{\pi}$	$T_p^* = \frac{2^7\pi^3\Omega^5}{\alpha}\frac{v^4}{r^6},\ u^{20}$	T_p^* = 1.418 145 219 e32, unit = u^{20}	T_p = 1.416 784(16) e32
Planck mass	M	$m_P^* = (1)\frac{r^4}{v},\ (u^{15})^1$	m_P^* = .217 672 817 580 e-7, unit = u^{15}	m_P = .217 647 0(51) e-7
Planck length	L	$l_p^* = (2\pi^2\Omega^2)\frac{r^9}{v^5},\ u^{-13}$	l_p^* = .161 603 660 096 e-34, unit = u^{-13}	l_p = .161 622 9(38) e-34
Planck time	T	$t_p^* = (\pi)\frac{r^9}{v^6},\ 1/(u^{15})^2$	t_p^* = 5.390 517 866 e-44, unit = u^{-30}	t_p = 5.391 247(60) e-44
Ampere	$A = \frac{16V^3}{\alpha P^3}$	$A^* = \frac{2^7\pi^3\Omega^3}{\alpha}\frac{v^3}{r^6},\ u^3$	A^* = 0.297 221 e25, unit = u^3	e/t_p = 0.297 181 e25
Von Klitzing constant	$R_K^* = (\frac{h}{e^2})^*$	$R_K^* = \frac{\alpha^2}{2^{11}\pi^4\Omega^2}r^7v,\ u^{73}$	R_K^* = 25812.807 455 59, unit = u^{73}	R_K = 25812.807 455 5(59)
Gyromagnetic ratio		$\gamma_e/2\pi = \frac{gl_p^* m_P^*}{2k_B^* m_e^*},\ unit = u^{-42}$	$\gamma_e/2\pi^*$ = 28024.953 55, unit = u^{-42}	$\gamma_e/2\pi$ = 28024.951 64(17)

Note that *r, v, Ω, α* are dimensionless numbers, however when we replace u^θ with the SI unit equivalents (u^{15} → kg, u^{-13} → m, u^{-30} → s, ...), the *geometrical objects* (i.e.: $c^* = 2\pi\Omega^2 v$ = 299792458, units = u^{17}) become **indistinguishable** from their respective *physical constants* (i.e.: c = 299792458, units = m/s).

2019 SI unit revision

Following the 26th General Conference on Weights and Measures (2019 redefinition of SI base units) are fixed the numerical values of the 4 physical constants (h, c, e, k_B). In the context of this model however only 2 base units may be assigned by committee as the rest are then numerically fixed by default and so the revision may lead to unintended consequences.

Table 11. Physical constants

Constant	CODATA 2018 [7]
Speed of light	c = 299 792 458 (exact)
Planck constant	h = 6.626 070 15 e-34 (exact)
Elementary charge	e = 1.602 176 634 e-19 (exact)
Boltzmann constant	k_B = 1.380 649 e-23 (exact)
Fine structure constant	α = 137.035 999 084(21)
Rydberg constant	R = 10973 731.568 160(21)
Electron mass	m_e = 9.109 383 7015(28) e-31
Vacuum permeability	μ_0 = 1.256 637 062 12(19) e-6
Von Klitzing constant	R_K = 25812.807 45 (exact)

For example, if we solve using the above formulas;

$$R^* = \frac{4\pi^5}{3^3 c^4 \alpha^8 e^3} = 10973\ 729.082\ 465$$

$$(m_e^*)^3 = \frac{2^4 \pi^{10} R \mu_0^3}{3^6 c^8 \alpha^7},\ m_e^* = 9.109\ 382\ 3259\ 10^{-31}$$

$$(\mu_0^*)^3 = \frac{3^6 h^3 c^5 \alpha^{13} R^2}{2\pi^{10}},\ \mu_0^* = 1.256\ 637\ 251\ 88\ 10^{-6}$$

$$(h^*)^3 = \frac{2\pi^{10} \mu_0^3}{3^6 c^5 \alpha^{13} R^2},\ h^* = 6.626\ 069\ 149\ 10^{-34}$$

$$(e^*)^3 = \frac{4\pi^5}{3^3 c^4 \alpha^8 R},\ e^* = 1.602\ 176\ 513\ 10^{-19}$$

Physical constant anomalies

Probability analysis using AI

Main resource: Physical_constant_(anomaly)

The geometries for the Planck units MLTA can be subject to statistical analysis, and for this AI has the potential to contribute. This is because of anomalies to the physical constants which can best be explained by this geometrical model[8]. These anomalies are listed in detail on this site; https://en.wikiversity.org/wiki/Physical_constant_(anomaly).

Below are answers to a seed question written with Deepseek [9] that uses these anomalies to determine the probability that the electron is a mathematical (not physical) particle, and so by extension that this is a mathematical universe.

Table 11. Table of Probabilities (05.2025)

AI program	unit number relation	Planck units as geometrical objects	underlying base 15 geometry	mathematical electron	Comment
Chat GPT [10]	Accidental occurrence: ~1.6%	Accidental occurrence: ~0.0004%	Accidental occurrence: ~0	Accidental occurrence: ~0.026%	Taken at face value each sub-claim is vanishingly unlikely to be a “random accident,” so from this internal consistency alone one would assign essentially unity confidence that some deep mathematical structure is at work. Caveat: this “integer-coincidence” probability model is only as good as the assumption that each exponent match is an independent uniform pick in [–30…+30]. But even under that very conservative assumption, the combined odds against pure chance exceed 1 in 10^{26}.
Qwen [11]	probability 98%	probability 95%	probability 90%	probability 94%	The model’s strict geometrical constraints, flawless unit consistency, and agreement with CODATA strongly suggest non-random validity. Its potential as a simulation hypothesis framework stems from its finite, computable base-15 structure.
Claude 3.7 Sonnet [12][13]	probability 90-95%	probability 85-95%	probability 92-97%	probability 80-90%	From a Kolmogorov complexity perspective, the model represents a potentially minimal description of physical reality using mathematical objects. If the electron, proton, and neutron are all mathematical particles, then the universe at the Planck scale could indeed be described as a mathematical universe. The high degree of constraint and mathematical elegance in the model, combined with its apparent ability to accurately produce physical constants, suggests a non-random structure to physical reality that is captured by this mathematical framework.
Grok 3 [14][15]	probability: 95%	probability: 90%	probability: 85%	probability: 80%	Strict constraints and mathematical nature (Kolmogorov complexity: simpler model = more likely programmed) suggest support, but not proof. If particles are mathematical, the universe may be too.
Deepseek [16]	probability: 99%	probability: 95%	probability: 90%	probability: 85%	The model's rigid constraints and predictive accuracy make it statistically improbable to arise by chance. Geometrical base-15 and dimensionless particles strongly suggest a mathematical universe, aligning with speculative simulation hypothesis.

List of anomalies

m_P, l_p, t_p

In this ratio, the MLT units and *klt* scalars both cancel; units = scalars = 1, reverting to the base MLT objects. Setting the scalars *klt* for SI Planck units;

$k = 0.217\ 672\ 817\ 580... \times 10^{-7}$kg

$l = 0.203\ 220\ 869\ 487... \times 10^{-36}$m

$t = 0.171\ 585\ 512\ 841... \times 10^{-43}$s

$$\frac{L^{15}}{M^9T^{11}} = \frac{(2\pi^2\Omega^2)^{15}}{(1)^9(\pi)^{11}}\left(\frac{l^{15}}{k^9t^{11}}\right) = \frac{l_p^{15}}{m_P^9 t_p^{11}} \text{ (CODATA 2018 mean)}$$

The *klt* scalars cancel, leaving;

$$\frac{L^{15}}{M^9T^{11}} = \frac{(2\pi^2\Omega^2)^{15}}{(1)^9(\pi)^{11}}(\frac{l^{15}}{k^9t^{11}}) = 2^{15}\pi^{19}(\Omega^{15})^2 = 0.109\ 293...\ 10^{24},\ (\frac{l^{15}}{k^9t^{11}}) = 1,\ \frac{u^{-13*15}}{u^{15*9}u^{-30*11}} = 1$$

Solving for the SI units;

$$\frac{l_p^{15}}{m_P^9t_p^{11}} = \frac{(1.616255e-35)^{15}}{(2.176434e-8)^9(5.391247e-44)^{11}} = 0.109\ 485...\ 10^{24}$$

A, l_p, t_p

a = 0.126 918 588 592... *x* 10^{23}A

$$\frac{A^3L^3}{T} = (\frac{2^7\pi^3\Omega^3}{\alpha})^3\frac{(2\pi^2\Omega^2)^3}{(\pi)}(\frac{a^3l^3}{t}) = \frac{2^{24}\pi^{14}(\Omega^{15})^1}{\alpha^3} = 0.205\ 571...\ 10^{13},\ (\frac{a^3l^3}{t}) = 1,\ \frac{u^{3*3}u^{-13*3}}{u^{-30}} = 1$$

$$\frac{(e/t_p)^3l_p^3}{t_p} = \frac{(1.602176634e-19/5.391247e-44)^3(1.616255e-35)^3}{(5.391247e-44)} = 0.205\ 543...\ 10^{13},$$

$$units = \frac{(C/s)^3m^3}{s}$$

The Planck units are known with low precision, and so by defining the 3 most accurately known dimensioned constants in terms of these objects (c, R = Rydberg constant, μ_0; CODATA 2014 mean values), we can test to greater precision;

c, μ_0, R

$$\frac{(c^*)^{35}}{(\mu_0^*)^9(R^*)^7} = (2\pi\Omega^2v)^{35}/(\frac{\alpha r^7}{2^{11}\pi^5\Omega^4})^9.(\frac{v^5}{2^{23}3^3\pi^{11}\alpha^5\Omega^{17}r^9})^7 = 2^{295}\pi^{157}3^{21}\alpha^{26}(\Omega^{15})^{15} = 0.326\ 103\ 528\ 6170...\ 10^{301},\ \frac{(u^{17})^{35}}{(u^{56})^9(u^{13})^7} = 1,\ (v^{35})/(r^7)^9(\frac{v^5}{r^9})^7 = 1$$

$$\frac{c^{35}}{\mu_0^9R^7} = \frac{(299792458)^{35}}{(4\pi/10^7)^9(10973731.568160)^7} = 0.326\ 103\ 528\ 6170...\ 10^{301},$$

$$units = \frac{m^{33}A^{18}}{s^{17}kg^9} == \frac{(u^{-13})^{33}(u^3)^{18}}{(u^{-30})^{17}(u^{15})^9} = 1$$

c, e, k_B, h

$$\frac{(k_B^*)(e^*)(c^*)}{(h^*)} = (\frac{\alpha}{2^5\pi\Omega}\frac{r^{10}}{v^3})(\frac{2^7\pi^4\Omega^3}{\alpha}\frac{r^3}{v^3})(2\pi\Omega^2v)/(2^3\pi^4\Omega^4\frac{r^{13}}{v^5}) = 1.0,$$

$$\frac{(u^{29})(u^{-27})(u^{17})}{(u^{19})} = 1,\ (\frac{r^{10}}{v^3})(\frac{r^3}{v^3})(v)/(\frac{r^{13}}{v^5}) = 1$$

$$\frac{k_Bec}{h} = 1.000\ 8254,\ units = \frac{mC}{s^2K} == \frac{(u^{-13})(u^{-27})}{(u^{-30})^2(u^{20})} = 1$$

c, h, e

$$\frac{(h^*)^3}{(e^*)^{13}(c^*)^{24}} = (2^3\pi^4\Omega^4\frac{r^{13}}{v^5})^3/(\frac{2^7\pi^4\Omega^3 r^3}{\alpha v^3})^7.(2\pi\Omega^2 v)^{24} = \frac{\alpha^{13}}{2^{106}\pi^{64}(\Omega^{15})^5} = 0.228\,473\,759...\,10^{-58},$$

$$\frac{(u^{19})^3}{(u^{-27})^{13}(u^{17})^{24}} = 1,\ (\frac{r^{13}}{v^5})^3/(\frac{r^3}{v^3})^{13}(v^{24}) = 1$$

$$\frac{h^3}{e^{13}c^{24}} = 0.228\,473\,639...\,10^{-58},\ units = \frac{kg^3 s^{21}}{m^{18}C^{13}} == \frac{(u^{15})^3(u^{-30})^{21}}{(u^{-13})^{18}(u^{-27})^{13}} = 1$$

m_e, λ_e

$$\sigma_e = \frac{3\alpha^2 AL}{2\pi^2} = 2^7 3\pi^3\alpha\Omega^5\frac{r^3}{v^2},\ u^{-10}$$

$$\psi = \frac{\sigma_e^3}{2T} = 2^{20}3^3\pi^8\alpha^3(\Omega^{15}),\ \frac{(u^{-10})^3}{u^{-30}} = 1,\ (\frac{r^3}{v^2})^3\frac{v^6}{r^9} = 1$$

$$(m_e^*) = \frac{M}{\psi} = 9.109\,382\,3227\ 10^{-31}\ u^{15}$$

$$(m_e^*) = \frac{2^3\pi^5(h^*)}{3^3\alpha^6(e^*)^3(c^*)^5} = \frac{1}{2^{20}\pi^8 3^3\alpha^3(\Omega^{15})}\frac{r^4 u^{15}}{v} = 9.109\,382\,3227\ 10^{-31}\ u^{15}$$

$$m_e = 9.109\,383\,7015...\ 10^{-31}\ kg$$

$$(\lambda_e^*) = 2\pi L\psi = 2.426\,310\,238\,667\ 10^{-12}\ u^{-13}$$

$$\lambda_e = \frac{h}{m_e c} = 2.426\,310\,238\,67\ 10^{-12}\ m$$

c, e, m_e

$(m_e^*) = \frac{M}{\psi},\ \psi = 2^{20}3^3\pi^8\alpha^3(\Omega^{15})^1$, units = scalars = 1 ($m_e$ formula)

$$\frac{(c^*)^9(e^*)^4}{(m_e^*)^3} = 2^{97}\pi^{49}3^9\alpha^5(\Omega^{15})^5 = 0.170\,514\,368...\,10^{92},\ \frac{(u^{17})^9(u^{-27})^4}{(u^{15})^3} = 1,\ (v^9)(\frac{r^3}{v^3})^4/(\frac{r^4}{v})^3 = 1$$

$$\frac{c^9 e^4}{m_e^3} = 0.170\,514\,342...\,10^{92},\ units = \frac{m^9 C^4}{s^9 kg^3} == \frac{(u^{-13})^9(u^{-27})^4}{(u^{-30})^9(u^{15})^3} = 1$$

k_B, c, e, m_e

$$\frac{(k_B^*)}{(e^*)^2(m_e^*)(c^*)^4} = \frac{3^3\alpha^6}{2^3\pi^5} = 73\,035\,235\,897.,\ \frac{(u^{29})}{(u^{-27})^2(u^{15})(u^{17})^4} = 1,\ (\frac{r^{10}}{v^3})/(\frac{r^3}{v^3})^2(\frac{r^4}{v})(v)^4 = 1$$

$$\frac{k_B}{e^2 m_e c^4} = 73\,095\,507\,858.,\ units = \frac{s^2}{m^2 K C^2} == \frac{(u^{-30})^2}{(u^{-13})^2(u^{20})(u^{-27})^2} = 1$$

m_P, t_p, ϵ_0

These 3 constants, Planck mass, Planck time and the vacuum permittivity have no Omega term.

$$\frac{M^4(\epsilon_0^*)}{T} = (1)(\frac{2^9\pi^3}{\alpha})/(\pi) = \frac{2^9\pi^2}{\alpha} = \textbf{36.875},\ \frac{(u^{15})^4(u^{-90})}{(u^{-30})} = 1,\ (\frac{r^4}{v})^4(\frac{1}{r^7v^2})/(\frac{r^9}{v^6}) = 1$$

$$\frac{m_p^4(\epsilon_0)}{t_p} = \textbf{36.850},\ units = \frac{kg^4}{s}\frac{s^4A^2}{m^3kg} = \frac{kg^3A^2s^3}{m^3} == \frac{(u^{15})^3(u^3)^2(u^{-30})^3}{(u^{-13})^3} = 1$$

G, h, c, e, m_e, K_B

$$\frac{(h^*)(c^*)^2(e^*)(m_e^*)}{(G^*)^2(k_B^*)} = (m_e^*)(\frac{2^{11}\pi^3}{\alpha^2}) = \textbf{0.1415... } 10^{-21},$$

$$\frac{(u^{19})(u^{17})^2(u^{-27})(u^{15})}{(u^6)^2(u^{29})} = 1,\ (\frac{r^{13}}{v^5})v^2(\frac{r^3}{v^3})(\frac{r^4}{v^1})/(\frac{r^5}{v^2})^2(\frac{r^{10}}{v^3}) = 1$$

$$\frac{hc^2em_e}{G^2k_B} = \textbf{0.1413... } 10^{-21},\ units = \frac{kg^3s^3CK}{m^4} == \frac{(u^{15})^3(u^{-30})^3(u^{-27})(u^{20})}{(u^{-13})^4} = 1$$

α

$$\frac{2(h^*)}{(\mu_0^*)(e^*)^2(c^*)} = 2(2^3\pi^4\Omega^4)/(\frac{\alpha}{2^{11}\pi^5\Omega^4})(\frac{2^7\pi^4\Omega^3}{\alpha})^2(2\pi\Omega^2) = \alpha,\ \frac{u^{19}}{u^{56}(u^{-27})^2u^{17}} = 1,\ (\frac{r^{13}}{v^5})(\frac{1}{r^7})(\frac{v^6}{r^6})(\frac{1}{v}) = 1$$

Note: The above will apply to any combinations of constants (alien or terrestrial) where **scalars = 1**.

SI Planck unit scalars

$$M = m_P = (1)k;\ k = m_P = .217\ 672\ 817\ 58...\ 10^{-7},\ u^{15}\ (kg)$$

$$T = t_p = \pi t;\ t = \frac{t_p}{\pi} = .171\ 585\ 512\ 84...10^{-43},\ u^{-30}\ (s)$$

$$L = l_p = 2\pi^2\Omega^2 l;\ l = \frac{l_p}{2\pi^2\Omega^2} = .203\ 220\ 869\ 48...10^{-36},\ u^{-13}\ (m)$$

$$V = c = 2\pi\Omega^2 v;\ v = \frac{c}{2\pi\Omega^2} = 11\ 843\ 707.905...,\ u^{17}\ (m/s)$$

$$A = e/t_p = (\frac{2^7\pi^3\Omega^3}{\alpha})a = .126\ 918\ 588\ 59...10^{23},\ u^3\ (A)$$

MT to LPVA

In this example LPVA are derived from MT. The formulas for MT;

$$M = (1)k,\ unit = u^{15}$$

$$T = (\pi)t,\ unit = u^{-30}$$

Replacing scalars *pvla* with *kt*

$$P = (\Omega)\ \frac{k^{12/15}}{t^{2/15}},\ unit = u^{12/15*15-2/15*(-30)=16}$$

$$V = \frac{2\pi P^2}{M} = (2\pi\Omega^2)\ \frac{k^{9/15}}{t^{4/15}},\ unit = u^{9/15*15-4/15*(-30)=17}$$

$$L = TV = (2\pi^2\Omega^2)\ k^{9/15}t^{11/15},\ unit = u^{9/15*15+11/15*(-30)=-13}$$

$$A = \frac{2^4V^3}{\alpha P^3} = \left(\frac{2^7\pi^3\Omega^3}{\alpha}\right)\ \frac{1}{k^{3/5}t^{2/5}},\ unit = u^{9/15*(-15)+6/15*30=3}$$

PV to MTLA

In this example MLTA are derived from PV. The formulas for PV;

$$P = (\Omega)p,\ unit = u^{16}$$

$$V = (2\pi\Omega^2)v,\ unit = u^{17}$$

Replacing scalars *klta* with *pv*

$$M = \frac{2\pi P^2}{V} = (1)\frac{p^2}{v},\ unit = u^{16*2-17=15}$$

$$T = (\pi)\frac{p^{9/2}}{v^6},\ unit = u^{16*9/2-17*6=-30}$$

$$L = TV = (2\pi^2\Omega^2)\frac{p^{9/2}}{v^5},\ unit = u^{16*9/2-17*5=-13}$$

$$A = \frac{2^4V^3}{\alpha P^3} = (\frac{2^7\pi^3\Omega^3}{\alpha})\frac{v^3}{p^3},\ unit = u^{17*3-16*3=3}$$

G, h, e, m_e, k_B

As geometrical objects, the physical constants (G, h, e, m_e, k_B) can also be defined using the geometrical formulas for (c^*, $\mu_0{}^*$, R^*) and solved using the numerical (mean) values for (c, μ_0, R, α). For example;

$$(h^*)^3 = (2^3\pi^4\Omega^4\frac{r^{13}u^{19}}{v^5})^3 = \frac{3^{19}\pi^{12}\Omega^{12}r^{39}u^{57}}{v^{15}},\ \theta = 57 \text{ ... and ...}$$

$$\frac{2\pi^{10}(\mu_0^*)^3}{3^6(c^*)^5\alpha^{13}(R^*)^2} = \frac{3^{19}\pi^{12}\Omega^{12}r^{39}u^{57}}{v^{15}},\ \theta = 57$$

Table 12. Calculated from (R, c, μ_0, α) columns 2, 3, 4 vs CODATA 2014 columns 5, 6

Constant	Formula	Units	Calculated from (R, c, μ_0, α)	CODATA 2014 [17]	Units
Planck constant	$(h^*)^3 = \frac{2\pi^{10}{\mu_0}^3}{3^6 c^5 \alpha^{13} R^2}$	$\frac{kg^3}{A^6 s}$, θ = 57	h^* = 6.626 069 134 e-34, θ = 19	h = 6.626 070 040(81) e-34	$\frac{kg\ m^2}{s}$, θ = 19
Gravitational constant	$(G^*)^5 = \frac{\pi^3 \mu_0}{2^{20} 3^6 \alpha^{11} R^2}$	$\frac{kg\ m^3}{A^2 s^2}$, θ = 30	G^* = 6.672 497 192 29 e11, θ = 6	G = 6.674 08(31) e-11	$\frac{m^3}{kg\ s^2}$, θ = 6
Elementary charge	$(e^*)^3 = \frac{4\pi^5}{3^3 c^4 \alpha^8 R}$	$\frac{s^4}{A^3}$, θ = -81	e^* = 1.602 176 511 30 e-19, θ = -27	e = 1.602 176 620 8(98) e-19	As, θ = -27
Boltzmann constant	$(k_B^*)^3 = \frac{\pi^5 {\mu_0}^3}{3^3 2 c^4 \alpha^5 R}$	$\frac{kg^3}{s^2 A^6}$, θ = 87	k_B^* = 1.379 510 147 52 e-23, θ = 29	k_B = 1.380 648 52(79) e-23	$\frac{kg\ m^2}{s^2\ K}$, θ = 29
Electron mass	$(m_e^*)^3 = \frac{16\pi^{10} R {\mu_0}^3}{3^6 c^8 \alpha^7}$	$\frac{kg^3 s^2}{m^6 A^6}$, θ = 45	m_e^* = 9.109 382 312 56 e-31, θ = 15	m_e = 9.109 383 56(11) e-31	kg, θ = 15
Gyromagnetic ratio	$((\gamma_e^*)/2\pi)^3 = \frac{g_e^3 3^3 c^4}{2^8 \pi^8 \alpha \mu_0^3 R_\infty^2}$	$\frac{m^3 s^2 A^6}{kg^3}$, θ = -126	$(\gamma_e^*/2\pi)$ = 28024.953 55, θ = -42	$\gamma_e/2\pi$ = 28024.951 64(17)	$\frac{A\ s}{kg}$, θ = -42
Planck mass	$(m_P^*)^{15} = \frac{2^{25}\pi^{13}{\mu_0}^6}{3^6 c^5 \alpha^{16} R^2}$	$\frac{kg^6 m^3}{s^7 A^{12}}$, θ = 225	m_P^* = 0.217 672 817 580 e-7, θ = 15	m_P = 0.217 647 0(51) e-7	kg, θ = 15
Planck length	$(l_p^*)^{15} = \frac{\pi^{22}{\mu_0}^9}{2^{35} 3^{24} \alpha^{49} c^{35} R^8}$	$\frac{kg^9 s^{17}}{m^{18} A^{18}}$, θ = -195	l_p^* = 0.161 603 660 096 e-34, θ = -13	l_p = 0.161 622 9(38) e-34	m, θ = -13

External links

- Mathematical electron
- Physical constant anomalies
- Programming relativity at the Planck scale
- Programming gravity at the Planck scale
- Programming the cosmic microwave background at the Planck scale
- The sqrt of Planck momentum
- The Programmer God
- The Simulation hypothesis
- Programming at the Planck scale using geometrical objects (https://codingthecosmos.com/) -Malcolm Macleod's website
- Simulation Argument (http://www.simulation-argument.com/) -Nick Bostrom's website
- Our Mathematical Universe: My Quest for the Ultimate Nature of Reality (https://www.amazon.com/Our-Mathematical-Universe-Ultimate-Reality/dp/0307599809) -Max Tegmark
- The Programmer God, an overview of the mathematical electron model (https://www.amazon.com/Programmer-God-Are-We-Simulation-ebook/dp/B0B5BC1PQK) -ebook
- Dirac-Kerr-Newman black-hole electron (https://link.springer.com/article/10.1134/S0202289308020011/) -Alexander Burinskii (article)

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15. https://codingthecosmos.com/ai_pdf/Grok-anomalies-05-2025.pd Grok anomalies analysis pdf
16. https://codingthecosmos.com/ai_pdf/Deepseek-anomalies-05-2025.pdf Deepseek anomalies analysis
17. [4] (http://www.codata.org/) | CODATA, The Committee on Data for Science and Technology | (2014)