Transform Dictionary

Every constant of Nature defines a transform about two sets of Planck boundaries. Each closed-form expression reproduces the correct magnitude and units of the associated constant. Collectively, these expressions use all eight types of transforms in the hyperbolic partition equation—defining the structure of the Dictionary's columns.

Each entry includes a name, symbol,[1] and a bi-part equation with four signatures each. The first two signatures define the external geometric action and the external boundaries that action is taking place on. The last two define the internal geometric action and the internal inversion boundaries—a fixed feature, constructively shared by all constants.

Every equation in this Dictionary is followed by a paragraph labelling each algebraic participant in that equation. This is followed by the number and dimension predicted by this equation, which is then compared with the CODATA 2022 & 2018 listed values—in terms of their own error bars, where $\sigma = 1.00$ reflects an error equal to the size of the error bars.

These are followed by a measure of the change in precision—in digits—the precision change in digits that going from the CODATA 2018 value to the CODATA 2022 value represents. $\Delta_{\text{precision}} = 1.00$ represents an increase of 1 digit in precision. And finally, by a measure of how much the CODATA 2022 number represents a change to the old number, compared to its error bars. $\Delta_{\text{scaled}} = 1.00$ means the new number swung by the same size as the error bars of the old number.

This is followed by any relevant notes, such as "CODATA also lists this constant as…".

[1] All names with the word *relationship* in them have been given symbols meant to convey the constant's name. For example, the inverse meter-kelvin relationship is given the symbol $\frac{1}{m} \vdots \mathrm{K}$. Where $\vdots$ represents the word *relationship*. This is my symbol convention—not CODATA's.

Legend

$t_p = 5.39125836832313 \ldots \times 10^{-44}$ s — Planck time
$l_p = 1.61625918175645 \ldots \times 10^{-35}$ m — Planck length
$q_p = 1.87554596713962 \ldots \times 10^{-18}$ C — Planck charge
$T_p = 1.41678698590795 \ldots \times 10^{32}$ K — Planck temperature
$m_p = 2.17642683817579 \ldots \times 10^{-8}$ kg — Planck mass

$\boxtimes = 0.999999199973626 \ldots \times 10^{-7}$ dimensionless — inversion boundary
5 — number of dimensions
7 — break in scale symmetry

$ж_1 = 0.0854245431533304 \ldots$ — 1st hyperbolic partition constant
$ж_2 = 3.66756753485501 \ldots$ — 2nd hyperbolic partition constant
$ж_3 = -1.87649603900417 \ldots + 4.06615262615972 \ldots i$ — 3rd hpc
$ж_4 = -1.87649603900417 \ldots - 4.06615262615972 \ldots i$ — 4th hpc
$ж_r = 4.47826244916751 \ldots$ — hyperbolic radius constant
$ж_\theta = 2.00316562310924 \ldots$ — hyperbolic radian constant

$G_{Gi} = 1.01494160640965 \ldots$ — Gieseking's constant
$V_{fe} = 2.02988321281930 \ldots$ — figure-eight knot hyperbolic volume
$K = 0.915965594177219 0\ldots$ — Catalan's constant
$C_d = 0.291560904030818 \ldots$ — domino tiling constant
$D_d = 1.79162281206959 \ldots$ — dimer constant
$\omega_1 = 0.764977018528596 \ldots + 1.32497062714087 \ldots i$ — omega_1 constant
$\omega_2 = 1.529954037057192 \ldots$ — omega_2 constant

$i^{i^{i^{\cdots}}} = 0.438282936727032 \ldots + 0.360592471871385 \ldots i$ — power tower of i
$i = (-1)^{1/2}$ — imaginary unit
$\varphi_i = (-1)^{1/3}$ — imaginary golden ratio
$\varphi = 1.61803398874989$ — golden ratio
$\pi = 3.14159265358979 \ldots$ — Archimedes' constant
$P_{up} = 2.29558714939263 \ldots$ — universal parabolic constant
$s = 5.24411510858423 \ldots$ — arc length of the unit lemniscate
$L = 2.622057554292119 \ldots$ — lemniscate constant
$L_1 = 1.31102877714605 \ldots$ — 1st lemniscate constant
$L_2 = 0.599070117367796 \ldots$ — 2nd lemniscate constant
$C_U = 0.847213084793979 \ldots$ — ubiquitous constant
$G_{Ga} = 0.834626841674073 \ldots$ — Gauss's constant
$W_{\mathrm{We}} = 0.47494937998792 \ldots$ — Weierstrass constant

$C_{R1} = 0.998136044598509 \ldots$ — Ramanujan's 1st continued fraction constant
$\mathcal{L}_{Li} = 0.110001000000000 \ldots$ — Liouville's constant
$M = -1.74756459463318 \ldots$ — Madelung constant
$\mathcal{P} = 0.41468250985111 \ldots$ — prime constant

$e = 2.71828182845904 \ldots$	Euler's number
$x_\infty = 2.29316628741186 \ldots$	1st Foias constant
$\gamma = 0.577215664901532 \ldots$	Euler-Mascheroni constant
$S = 0.822825249678847 \ldots$	Sierpiński's constant
$D_{Do} = 0.739085133215160 \ldots$	Dottie number
$L_{LL} = 0.622743419349181 \ldots$	Laplace limit
$C_{CFP} = 1.19967864025773 \ldots$	Real fixed point of the hyperbolic cotangent
$j_{0,1} = 2.404825557695772 \ldots$	1st root of the Bessel function
$\alpha_F = 2.50290787509589 \ldots$	alpha Feigenbaum constant
$\delta_F = 4.66920160910299 \ldots$	delta Feigenbaum constant
$\mathcal{S} = 3.24697960371714 \ldots$	silver constant
$P = 1.32471795724474 \ldots$	plastic constant
$C_Q = 0.605443657196732 \ldots$	QRS constant
$K_{-6} = 1.15655237442151 \ldots$	Khinchin mean of order -6
$T_0 = 273.150000000000 \ldots$ kelvin	freezing point of water
$p_0 = 100{,}000.000000000 \ldots$ pascal	1 bar
$p_1 = 101{,}325.003754773 \ldots$ pascal	standard atmospheric pressure
$E_1 = 6.09110229711386 \ldots \times 10^{-24}$ joules	energy associated with $\Delta_{\nu_{Cs}}$
$f_1 = 5.40000000000000 \ldots \times 10^{14}$ Hz	frequency of max light conversion
$\lambda_{\text{peak}} = 4.96511423174427 \ldots$	peak λ of spectral radiance/unit wavelength
$\nu_{\text{peak}} = 2.82143937212207 \ldots$	peak emission of spectral flux/unit frequency
$n!$	factorial function
$!n$	derangement function
$\log(x)$	natural logarithm
$\Gamma(x)$	gamma function
$\zeta(x)$	Riemann zeta function

$$\sigma = \frac{\text{X}_{\text{pred}} - \text{X}_{\text{CODATA}}}{u_{\text{CODATA}}} \qquad \Delta_{\text{precision}} = \log_{10}\frac{u_{2018}}{u_{2022}} \qquad \Delta_{\text{scaled}} = \frac{X_{2022} - X_{2018}}{u_{2018}}$$

$\sigma = +1.00$ means the prediction is greater than the CODATA value by exactly one of CODATA's error bars; $\sigma = -1.00$ means it is 1.00 error bar less than the CODATA value, etc. For SI-defined entries we write the match level instead (e.g., "10-digit match").

$\Delta_{\text{precision}} = +1.00$ corresponds to an increase of precision by one significant digit from 2018 to 2022.

$\Delta_{\text{scaled}} = +1.00$ is the signed shift in value from 2018 to 2022, measured in units of the 2018 1σ error bars.

u denotes the standard 1σ uncertainty from CODATA.

units

s = second
m = meter
C = coulomb
K = kelvin
kg = kilogram

derived units

MHz = mega hertz = 1000000 1/s
fm = femto meter = 0.000000000000001 m
eV = electron volt = 1 eV
MeV = megaelectron volt = 1000000 eV
GeV = gigaelectron volt = 1000000000 eV

composite SI units

A = amp	the SI unit of electric current
F = farad	the SI unit of electrical capacitance
H = henry	the SI unit of electrical inductance
Hz = hertz	the SI unit of frequency
J = joule	the SI unit of energy
lm = lumens	the SI unit of luminous flux
mol = mole	the SI unit of amount of substance
N = newton	the SI unit of force
$\mathcal{N}$ = noether	the SI unit of momentum
Ω = ohm	the SI unit of electrical resistance
Pa = pascal	the SI unit of pressure
S = siemens	the SI unit of electric conductance
T = tesla	the SI unit of magnetic flux density
V = volt	the SI unit of voltage, or electric potential
W = watt	the SI unit of power (or radiant flux)
Wb = weber	the SI unit of magnetic flux

A = ampere = C/s
F = farad = $s^2\ C^2/m^2\ kg$
H = henry = $m^2\ kg/C^2$
Hz = hertz = 1/s
J = joule = $m^2\ kg/s^2$
lm = lumen = cd · sr
N = newton = $m\ kg/s^2$
$\mathcal{N}$ = noether = m kg/s
Ω = ohm = $m^2\ kg/s\ C^2$
Pa = pascal = $kg/s^2\ m$
S = siemens = $s\ C^2/m^2\ kg$
T = tesla = kg/s C
V = volt = $m^2\ kg/s^2\ C$
W = watt = $m^2 kg/s^3$
Wb = weber = $m^2\ kg/s\ C$

hyperfine transition frequency of Cs-133 -5.14637(54)

$$\Delta_{\nu_{\text{Cs}}} = \frac{E_1}{2\pi}\left(\frac{t_p}{{l_p}^2\, m_p}\right)\left(1 - \sqrt{\zeta(2)}\; {\text{ж}_\theta}^2 \boxtimes\right)$$

Where E_1 = the energy difference associated with the hyperfine transition frequency, π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, $\zeta(x)$ = the Riemann zeta function, ж_θ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\Delta_{\nu_{\text{Cs}}} = 9.19263177042970 \ldots \times 10^9$ Hz prediction
$\Delta_{\nu_{\text{Cs}}} = 9.192631770 \times 10^9$ Hz CODATA 2022, 10-digit match
$\Delta_{\nu_{\text{Cs}}} = 9.192631770 \times 10^9$ Hz CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

$E_1 = 6.09110229711386 \ldots \times 10^{-24}$ joules

electron volt-hertz relationship -5.1465(21)

$$\text{eV} : \text{Hz} = \frac{\text{eV}}{2\pi}\left(\frac{t_p}{{l_p}^2\, m_p}\right)\left(1 - \sqrt{\zeta(2)}\; {\text{ж}_\theta}^2 \boxtimes\right)$$

Where eV = the electron-volt, π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, $\zeta(x)$ = the Riemann zeta function, ж_θ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{eV} : \text{Hz} = 2.41798924253021 \ldots \times 10^{14}$ Hz prediction
$\text{eV} : \text{Hz} = 2.417989242 \times 10^{14}$ Hz CODATA 2022, 10-digit match
$\text{eV} : \text{Hz} = 2.417989242 \times 10^{14}$ Hz CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

joule-hertz relationship -5.1545(76)

$$\mathrm{J} \vdots \mathrm{Hz} = \frac{\text{joule}}{2\pi}\left(\frac{t_p}{{l_p}^2\, m_p}\right)\left(1 - \sqrt{\zeta(2)}\ {ж_\theta}^2\ ⊠\right)$$

Where π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{J} \vdots \mathrm{Hz} = 1.50919017971270 \ldots \times 10^{33}$ Hz prediction
$\mathrm{J} \vdots \mathrm{Hz} = 1.509190179 \times 10^{33}$ Hz CODATA 2022, 10-digit match
$\mathrm{J} \vdots \mathrm{Hz} = 1.509190179 \times 10^{33}$ Hz CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

hertz-joule relationship 5.1545(76)

$$\mathrm{Hz} \vdots \mathrm{J} = 2\pi\left(\frac{{l_p}^2\, m_p}{\mathrm{s}\ t_p}\right)\left(1 + \sqrt{\zeta(2)}\ {ж_\theta}^2\ ⊠\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, s = the second, t_p = the Planck time, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{Hz} \vdots \mathrm{J} = 6.62607014968851 \ldots \times 10^{-34}$ J prediction
$\mathrm{Hz} \vdots \mathrm{J} = 6.62607015 \times 10^{-34}$ J CODATA 2022, 10-digit match
$\mathrm{Hz} \vdots \mathrm{J} = 6.62607015 \times 10^{-34}$ J CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

hertz-electron volt relationship 5.1465(21)

$$\text{Hz} \vdots \text{eV} = 2\pi \, \frac{\text{joule}}{\text{eV}} \left(\frac{l_p{}^2 \, m_p}{\text{s} \, t_p} \right) \left(1 + \sqrt{\zeta(2)} \, ж_\theta{}^2 \, \boxtimes \right)$$

Where π = Archimedes' constant, eV = the electron-volt, l_p = the Planck length, m_p = the Planck mass, s = the second, t_p = the Planck time, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{Hz} \vdots \text{eV} = 4.1356676961611 5 \ldots \times 10^{-15}$ eV — prediction
$\text{Hz} \vdots \text{eV} = 4.135667696 \times 10^{-15}$ eV — CODATA 2022, 10-digit match
$\text{Hz} \vdots \text{eV} = 4.135667696 \times 10^{-15}$ eV — CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

natural unit of action in eV s 5.1507(48)

$$\dot{\hbar} = \frac{\text{joule}}{\text{eV}} \left(\frac{l_p{}^2 \, m_p}{t_p} \right) \left(1 + \sqrt{\zeta(2)} \, ж_\theta{}^2 \, \boxtimes \right)$$

Where eV = the electron-volt, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\dot{\hbar} = 6.58211956829518 \ldots \times 10^{-16}$ eV · s — prediction
$\dot{\hbar} = 6.582119569 \times 10^{-16}$ eV · s — CODATA 2022, 9-digit match
$\dot{\hbar} = 6.582119569 \times 10^{-16}$ eV · s — CODATA 2018, 9-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

reduced Planck constant 5.1407(48)

$$\hbar = \left(\frac{{l_p}^2 \, m_p}{t_p} \right) \left(1 + \sqrt{\zeta(2)} \, {ж_\theta}^2 \, ⊠ \right)$$

Where l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\hbar = 1.05457181759658 \ldots \times 10^{-34}\ \mathrm{J \cdot s}$ prediction
$\hbar = 1.054571817 \times 10^{-34}\ \mathrm{J \cdot s}$ CODATA 2022, 10-digit match
$\hbar = 1.054571817 \times 10^{-34}\ \mathrm{J \cdot s}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

Also listed as the *atomic unit of action*, and the *natural unit of action*.

Planck constant 5.1507(48)

$$h = 2\pi \left(\frac{{l_p}^2 \, m_p}{t_p} \right) \left(1 + \sqrt{\zeta(2)} \, {ж_\theta}^2 \, ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$h = 6.6260701496885 1\ldots \times 10^{-34}\ \mathrm{J \cdot s}$ prediction
$h = 6.62607015 \times 10^{-34}\ \mathrm{J \cdot s}$ CODATA 2022, 10-digit match
$h = 6.62607015 \times 10^{-34}\ \mathrm{J \cdot s}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

quantum of circulation 5.1470(31)

$$q_c = \pi \left(\frac{{l_p}^2 \, m_p}{t_p \, m_e} \right) \left(1 + \sqrt{\zeta(2)} \, {ж_\theta}^2 \, ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$q_c = 3.63694754800779 \ldots \times 10^{-4}\ \mathrm{m^2/s}$ prediction
$q_c = 3.6369475467(11) \times 10^{-4}\ \mathrm{m^2/s}$ CODATA 2022, $\sigma = +1.19$
$q_c = 3.6369475516(11) \times 10^{-4}\ \mathrm{m^2/s}$ CODATA 2018, $\sigma = -3.27$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -4.45$

quantum of circulation times 2 5.1470(31)

$$2q_c = 2\pi \left(\frac{{l_p}^2 \, m_p}{t_p \, m_e} \right) \left(1 + \sqrt{\zeta(2)} \, {ж_\theta}^2 \, ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$2q_c = 7.27389509601558 \ldots \times 10^{-4}\ \mathrm{m^2/s}$ prediction
$2q_c = 7.2738950934(22) \times 10^{-4}\ \mathrm{m^2/s}$ CODATA 2022, $\sigma = +1.19$
$2q_c = 7.2738951032(22) \times 10^{-4}\ \mathrm{m^2/s}$ CODATA 2018, $\sigma = -3.27$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -4.45$

Bohr magneton in eV/T 5.1569(29)

$$\frac{\mu_B}{e} = \frac{1}{2}\left(\frac{{l_p}^2\,\mathrm{C}\,m_p}{t_p\,m_e}\right)\left(1 + \sqrt{\zeta(2)}\,{ж_\theta}^2\,⊠\right)$$

Where l_p = the Planck length, C = the coulomb, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_B/e = 5.78838180031388 \ldots \times 10^{-5}$ eV/T prediction
$\mu_B/e = 5.7883817982(18) \times 10^{-5}$ eV/T CODATA 2022, $\sigma = +1.17$
$\mu_B/e = 5.7883818060(17) \times 10^{-5}$ eV/T CODATA 2018, $\sigma = -3.35$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.59$

nuclear magneton in eV/T 5.1471(29)

$$\frac{\mu_N}{e} = \frac{1}{2}\left(\frac{{l_p}^2\,\mathrm{C}\,m_p}{t_p\,m_+}\right)\left(1 + \sqrt{\zeta(2)}\,{ж_\theta}^2\,⊠\right)$$

Where l_p = the Planck length, C = the coulomb, m_p = the Planck mass, t_p = the Planck time, m_+ = the proton mass, $\zeta(x)$ = the Riemann zeta function, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_N/e = 3.15245125534845 \ldots \times 10^{-8}$ eV/T prediction
$\mu_N/e = 3.15245125417(98) \times 10^{-8}$ eV/T CODATA 2022, $\sigma = +1.20$
$\mu_N/e = 3.15245125844(96) \times 10^{-8}$ eV/T CODATA 2018, $\sigma = -3.22$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.45$

inverse of conductance quantum 4.39950(25)

$$G_0{}^{-1} = \frac{\pi}{ж_1{}^2}\left(\frac{l_p{}^2 m_p}{t_p\, q_p{}^2}\right)\left(1 + \sqrt{\zeta(3)}\, ж_\theta{}^2\, ⊠\right)$$

Where $\pi =$ Archimedes' constant, $ж_1 =$ the 1st hyperbolic partition constant, $l_p =$ the Planck length, $m_p =$ the Planck mass, $t_p =$ the Planck time, $q_p =$ the Planck charge, $\zeta(x) =$ the Riemann zeta function, $ж_\theta =$ the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$G_0{}^{-1} = 1.29064037306099 \ldots \times 10^4\ \Omega$ prediction
$G_0{}^{-1} = 1.290640372 \times 10^4\ \Omega$ CODATA 2022, 9-digit match
$G_0{}^{-1} = 1.290640372 \times 10^4\ \Omega$ CODATA 2018, 9-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

$\zeta(3) =$ Apéry's constant

conductance quantum -4.39950(25)

$$G_0 = \frac{ж_1{}^2}{\pi}\left(\frac{t_p\, q_p{}^2}{l_p{}^2 m_p}\right)\left(1 - \sqrt{\zeta(3)}\, ж_\theta{}^2\, ⊠\right)$$

Where $ж_1 =$ the 1st hyperbolic partition constant, $\pi =$ Archimedes' constant, $t_p =$ the Planck time, $q_p =$ the Planck charge, $l_p =$ the Planck length, $m_p =$ the Planck mass, $\zeta(x) =$ the Riemann zeta function, $ж_\theta =$ the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$G_0 = 7.74809172928722 \ldots \times 10^{-5}$ S prediction
$G_0 = 7.748091729 \times 10^{-5}$ S CODATA 2022, 10-digit match
$G_0 = 7.748091729 \times 10^{-5}$ S CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

electron volt 0.3756(31)

$$\text{eV} = ж_1 \left(\frac{q_p}{\text{C}} \right) \left(1 + \frac{e^{-\gamma}}{6} ж_\theta{}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, q_p = the Planck charge, C = the coulomb, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{eV} = 1.60217663422016 \ldots \times 10^{-19}\ \text{J}$ prediction
$\text{eV} = 1.602176634 \times 10^{-19}\ \text{J}$ CODATA 2022, 10-digit match
$\text{eV} = 1.602176634 \times 10^{-19}\ \text{J}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

Also listed as the *electron volt-joule relationship*.

joule-electron volt relationship -0.37485(80)

$$\text{J} \vdots \text{eV} = \frac{\text{joule}}{ж_1} \left(\frac{\text{C}}{q_p} \right) \left(1 - \frac{e^{-\gamma}}{6} ж_\theta{}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, q_p = the Planck charge, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{J} \vdots \text{eV} = 6.24150907360309 \ldots \times 10^{18}\ \text{eV}$ prediction
$\text{J} \vdots \text{eV} = 6.241509074 \times 10^{18}\ \text{eV}$ CODATA 2022, 10-digit match
$\text{J} \vdots \text{eV} = 6.241509074 \times 10^{18}\ \text{eV}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

electron charge to mass quotient 0.3741(30)

$$-\frac{e}{m_e} = -ж_1\left(\frac{q_p}{m_e}\right)\left(1 + \frac{e^{-\gamma}}{6}\,ж_\theta{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, q_p = the Planck charge, m_e = the electron mass, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$-e/m_e = -1.75882000934636\ldots \times 10^{11}$ C/kg prediction
$-e/m_e = -1.75882000838(55) \times 10^{11}$ C/kg CODATA 2022, $\sigma = -1.76$
$-e/m_e = -1.75882001076(53) \times 10^{11}$ C/kg CODATA 2018, $\sigma = -2.67$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.49$

proton charge to mass quotient 0.3743(31)

$$\frac{e}{m_+} = ж_1\left(\frac{q_p}{m_+}\right)\left(1 + \frac{e^{-\gamma}}{6}\,ж_\theta{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, q_p = the Planck charge, m_+ = the proton mass, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$e/m_+ = 9.57883314831657\ldots \times 10^{7}$ C/kg prediction
$e/m_+ = 9.5788331430(29) \times 10^{7}$ C/kg CODATA 2022, $\sigma = +1.83$
$e/m_+ = 9.5788331560(29) \times 10^{7}$ C/kg CODATA 2018, $\sigma = -2.65$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -4.48$

Bohr magneton in Hz/T 0.3841(30)

$$\frac{\mu_B}{h} = \frac{ж_1}{4\pi}\,\text{tesla}^2\left(\frac{q_p}{m_e}\right)\left(1+\frac{e^{-\gamma}}{6}\,ж_\theta{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, q_p = the Planck charge, m_e = the electron mass, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_B/h = 1.39962449248203 \ldots \times 10^{10}$ Hz/T prediction
$\mu_B/h = 1.39962449171(44) \times 10^{10}$ Hz/T CODATA 2022, $\sigma = +1.75$
$\mu_B/h = 1.39962449361(42) \times 10^{10}$ Hz/T CODATA 2018, $\sigma = -2.69$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.52$

nuclear magneton in MHz/T 0.3743(30)

$$\frac{\mu_N}{h} = \frac{ж_1}{4\pi}\,\frac{1}{\text{MHz}}\left(\frac{q_p}{\text{s}\,m_+}\right)\left(1+\frac{e^{-\gamma}}{6}\,ж_\theta{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, MHz = a megahertz, q_p = the Planck charge, s = the second, m_+ = the proton mass, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_N/h = 7.62259322303543 \ldots$ MHz/T prediction
$\mu_N/h = 7.6225932188(24)$ MHz/T CODATA 2022, $\sigma = +4.68$
$\mu_N/h = 7.6225932291(23)$ MHz/T CODATA 2018, $\sigma = -2.64$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.48$

lattice parameter of silicon 1343.66(16)

$$a = \frac{4\pi}{32\ s}\ \frac{1}{ж_1{}^4}\left(\frac{l_p\ m_p}{m_e}\right)\left(1 + 35\left(\frac{4\pi}{8}\right)^5 ж_\theta{}^2\ \boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$a = 5.43102018763799 \ldots \times 10^{-10}$ m prediction
$a = 5.431020511(89) \times 10^{-10}$ m CODATA 2022, $\sigma = -3.63$
$a = 5.431020511(89) \times 10^{-10}$ m CODATA 2018, $\sigma = -3.63$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

lattice spacing of ideal Si (220) 1343.66(17)

$$d_{220} = \frac{1}{\sqrt{8}}\ \frac{4\pi}{32\ s}\ \frac{1}{ж_1{}^4}\left(\frac{l_p\ m_p}{m_e}\right)\left(1 + 35\left(\frac{4\pi}{8}\right)^5 ж_\theta{}^2\ \boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$d_{220} = 1.92015560171993 \ldots \times 10^{-10}$ m prediction
$d_{220} = 1.920155716(32) \times 10^{-10}$ m CODATA 2022, $\sigma = -3.57$
$d_{220} = 1.920155716(32) \times 10^{-10}$ m CODATA 2018, $\sigma = -3.57$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Rydberg constant −8.955076(11)

$$R_\infty = \frac{ж_1{}^4}{4\pi}\left(\frac{m_e}{l_p\,m_p}\right)\left(1-\frac{1}{8}\left(\frac{6}{\mathrm{V_{fe}}}\right)^2 ж_\theta{}^3 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, m_e = the electron mass, l_p = the Planck length, m_p = the Planck mass, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$R_\infty = 1.09737315681100\ldots \times 10^7\ \ 1/\mathrm{m}$ prediction
$R_\infty = 1.0973731568157(12) \times 10^7\ \ 1/\mathrm{m}$ CODATA 2022, $\sigma = -3.92$
$R_\infty = 1.0973731568160(21) \times 10^7\ \ 1/\mathrm{m}$ CODATA 2018, $\sigma = -2.38$
$\Delta_{\text{precision}} = +0.24$
$\Delta_{\text{scaled}} = -0.14$

hartree-inverse meter relationship −8.781944(11)

$$E_h \vdots \frac{1}{\mathrm{m}} = \frac{ж_1{}^4}{2\pi}\left(\frac{m_e}{l_p\,m_p}\right)\left(1-\frac{1}{8}\left(\frac{6}{\mathrm{V_{fe}}}\right)^2 ж_\theta{}^3 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, m_e = the electron mass, l_p = the Planck length, m_p = the Planck mass, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$E_h \vdots 1/\mathrm{m} = 2.19474631362199\ldots \times 10^7\ \ 1/\mathrm{m}$ prediction
$E_h \vdots 1/\mathrm{m} = 2.1947463136314(24) \times 10^7\ \ 1/\mathrm{m}$ CODATA 2022, $\sigma = -3.92$
$E_h \vdots 1/\mathrm{m} = 2.1947463136320(43) \times 10^7\ \ 1/\mathrm{m}$ CODATA 2018, $\sigma = -2.33$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.14$

inverse meter-hartree relationship 8.781944(11)

$$\frac{1}{\mathrm{m}} \vdots E_h = \frac{2\pi}{ж_1{}^4}\left(\frac{l_p\, m_p}{\mathrm{m}\, m_e}\right)\left(1 + \frac{1}{8}\left(\frac{6}{\mathrm{V_{fe}}}\right)^2 ж_\theta{}^3 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m = the meter, m_e = the electron mass, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$1/\mathrm{m} \vdots E_h = 4.55633525292920 \ldots \times 10^{-8}\, E_h$ prediction
$1/\mathrm{m} \vdots E_h = 4.5563352529132(50) \times 10^{-8}\, E_h$ CODATA 2022, $\sigma = +3.20$
$1/\mathrm{m} \vdots E_h = 4.5563352529120(88) \times 10^{-8}\, E_h$ CODATA 2018, $\sigma = +1.95$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = +1.36$

conventional value of ampere-90 0.888722(50)

$$A_{90} = \text{ampere}\left(1 + \frac{1}{\mathcal{S}}\left(\frac{4\pi}{35}\right)ж_{\theta}{}^{3}\boxtimes\right)$$

Where $\mathcal{S}$ = the silver constant, π = Archimedes' constant, $ж_{\theta}$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{90} = 1.00000008888173 \ldots$ A prediction

$A_{90} = 1.00000008887$ A CODATA 2022, 11.93-digit match

$A_{90} = 1.00000008887$ A CODATA 2018, 11.93-digit match

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +0.00$

conventional value of coulomb-90 0.888750(50)

$$C_{90} = \text{coulomb}\left(1 + \frac{1}{\mathcal{S}}\left(\frac{4\pi}{35}\right)ж_{\theta}{}^{3}\boxtimes\right)$$

Where $\mathcal{S}$ = the silver constant, π = Archimedes' constant, $ж_{\theta}$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$C_{90} = 1.00000008888173 \ldots$ C prediction

$C_{90} = 1.00000008887$ C CODATA 2022, 11.93-digit match

$C_{90} = 1.00000008887$ C CODATA 2018, 11.93-digit match

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +0.00$

Bohr magneton in inverse meter per tesla 3.9855(30)

$$\frac{\mu_B}{hc} = \frac{ж_1}{4\pi}\left(\frac{t_p\, q_p}{l_p\, m_e}\right)\left(1 + \mathcal{S}\left(\frac{K}{6}\right) ж_\theta{}^3 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_e = the electron mass, $\mathcal{S}$ = the silver constant, K = Catalan's constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_B/hc = 4.66864477302116 \ldots \times 10^1\ 1/\mathrm{m}\cdot\mathrm{T}$ prediction
$\mu_B/hc = 4.6686447719(15) \times 10^1\ 1/\mathrm{m}\cdot\mathrm{T}$ CODATA 2022, $\sigma = +0.75$
$\mu_B/hc = 4.6686447783(14) \times 10^1\ 1/\mathrm{m}\cdot\mathrm{T}$ CODATA 2018, $\sigma = -3.77$
$\Delta_{\text{precision}} = -0.07$
$\Delta_{\text{scaled}} = -4.57$

nuclear magneton in inverse meter per tesla 3.9855(30)

$$\frac{\mu_N}{hc} = \frac{ж_1}{4\pi}\left(\frac{t_p\, q_p}{l_p\, m_+}\right)\left(1 + \mathcal{S}\left(\frac{K}{6}\right) ж_\theta{}^3 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_+ = the proton mass, $\mathcal{S}$ = the silver constant, K = Catalan's constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_N/hc = 2.5426234106894 0 \ldots \times 10^{-2}\ 1/\mathrm{m}\cdot\mathrm{T}$ prediction
$\mu_N/hc = 2.54262341009(79) \times 10^{-2}\ 1/\mathrm{m}\cdot\mathrm{T}$ CODATA 2022, $\sigma = +0.76$
$\mu_N/hc = 2.54262341353(78) \times 10^{-2}\ 1/\mathrm{m}\cdot\mathrm{T}$ CODATA 2018, $\sigma = -3.64$
$\Delta_{\text{precision}} = -0.13$
$\Delta_{\text{scaled}} = -4.41$

Coulomb's constant 0.7816(15)

$$\kappa = \left(\frac{{l_p}^3\, m_p}{{t_p}^2\, {q_p}^2}\right)\left(1 + \left(\frac{C_d}{6}\right) {ж_\theta}^4\, ⊠\right)$$

Where l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, C_d = the domino tiling constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\kappa = 8.98755179302985 \ldots \times 10^9\ \mathrm{m/F}$ prediction
$\kappa = 8.9875517923(14) \times 10^9\ \mathrm{m/F}$ Wikipedia 2022, $\sigma = +0.52$
$\kappa = 8.9875517923(14) \times 10^9\ \mathrm{m/F}$ CODATA 2018, $\sigma = +0.52$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

atomic unit of permittivity -0.7815(15)

$$\mathrm{A_{perm}} = \left(\frac{{t_p}^2\, {q_p}^2}{{l_p}^3\, m_p}\right)\left(1 - \left(\frac{C_d}{6}\right) {ж_\theta}^4\, ⊠\right)$$

Where t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_p = the Planck mass, C_d = the domino tiling constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{A_{perm}} = 1.11265005535270 \ldots \times 10^{-10}\ \mathrm{F/m}$ prediction
$\mathrm{A_{perm}} = 1.11265005620(17) \times 10^{-10}\ \mathrm{F/m}$ CODATA 2022, $\sigma = -4.98$
$\mathrm{A_{perm}} = 1.11265005545(17) \times 10^{-10}\ \mathrm{F/m}$ CODATA 2018, $\sigma = -4.78$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +4.41$

vacuum electric permittivity -0.7815(14)

$$\varepsilon_0 = \frac{1}{4\pi}\left(\frac{{t_p}^2\,{q_p}^2}{{l_p}^3\,m_p}\right)\left(1-\left(\frac{C_d}{6}\right)ж_\theta{}^4\,⊠\right)$$

Where π = Archimedes' constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_p = the Planck mass, C_d = the domino tiling constant, $ж_\theta$ = the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\varepsilon_0 = 8.85418781204269\ldots \times 10^{-12}$ F/m prediction
$\varepsilon_0 = 8.8541878188(14) \times 10^{-12}$ F/m CODATA 2022, $\sigma = -4.83$
$\varepsilon_0 = 8.8541878128(13) \times 10^{-12}$ F/m CODATA 2018, $\sigma = -0.58$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = +4.62$

Also called *vacuum permittivity*, or the *electric constant*.

atomic unit of time 12.390554(10)

$$\mathrm{A_{time}} = \frac{1}{ж_1{}^4}\left(\frac{t_p\, m_p}{m_e}\right)\left(1+\sqrt{5}\left(\frac{C_d}{C_U}\right)ж_\theta{}^4\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, m_p = the Planck mass, m_e = the electron mass, C_d = the domino tiling constant, C_U = the ubiquitous constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{A_{time}} = 2.418884326575 00 \ldots \times 10^{-17}$ s prediction
$\mathrm{A_{time}} = 2.4188843265864(26) \times 10^{-17}$ s CODATA 2022, $\sigma = -4.39$
$\mathrm{A_{time}} = 2.4188843265857(47) \times 10^{-17}$ s CODATA 2018, $\sigma = -2.28$
$\Delta_{\mathrm{precision}} = +0.26$
$\Delta_{\mathrm{scaled}} = +0.15$

hertz-hartree relationship 12.390554(10)

$$\mathrm{Hz} : E_h = \mathrm{watt}\,\frac{2\pi}{ж_1{}^4}\left(\frac{t_p\, m_p}{m_e}\right)\left(1+\sqrt{5}\left(\frac{C_d}{C_U}\right)ж_\theta{}^4\,\boxtimes\right)$$

Where π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, m_p = the Planck mass, m_e = the electron mass, C_d = the domino tiling constant, C_U = the ubiquitous constant, $ж_\theta$ = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{Hz} : E_h = 1.51982984605030 \ldots \times 10^{-16}\, E_h$ prediction
$\mathrm{Hz} : E_h = 1.5198298460574(17) \times 10^{-16}\, E_h$ CODATA 2022, $\sigma = -4.18$
$\mathrm{Hz} : E_h = 1.5198298460570(29) \times 10^{-16}\, E_h$ CODATA 2018, $\sigma = -2.31$
$\Delta_{\mathrm{precision}} = +0.23$
$\Delta_{\mathrm{scaled}} = +1.14$

hartree-hertz relationship -12.390554(10)

$$E_h : \text{Hz} = \frac{ж_1{}^4}{2\pi}\left(\frac{m_e}{t_p\, m_p}\right)\left(1-\sqrt{\mathbf{5}}\left(\frac{C_d}{C_U}\right)ж_\theta{}^4 ⊠\right)$$

Where $ж_1 =$ the 1st hyperbolic partition constant, $\pi =$ Archimedes' constant, $m_e =$ the electron mass, $t_p =$ the Planck time, $m_p =$ the Planck mass, $C_d =$ the domino tiling constant, $C_U =$ the ubiquitous constant, $ж_\theta =$ the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$E_h : \text{Hz} = 6.57968392052072 \ldots \times 10^{15}$ Hz prediction
$E_h : \text{Hz} = 6.5796839204999(72) \times 10^{15}$ Hz CODATA 2022, $\sigma = +2.89$
$E_h : \text{Hz} = 6.579683920502(13) \times 10^{15}$ Hz CODATA 2018, $\sigma = +1.44$
$\Delta_{\text{precision}} = +0.74$
$\Delta_{\text{scaled}} = -0.23$

Rydberg constant times c in Hz -12.390554(10)

$$\dot{R}_\infty c = \frac{ж_1{}^4}{4\pi}\left(\frac{m_e}{t_p\, m_p}\right)\left(1-\sqrt{\mathbf{5}}\left(\frac{C_d}{C_U}\right)ж_\theta{}^4 ⊠\right)$$

Where $ж_1 =$ the 1st hyperbolic partition constant, $\pi =$ Archimedes' constant, $m_e =$ the electron mass, $t_p =$ the Planck time, $m_p =$ the Planck mass, $C_d =$ the domino tiling constant, $C_U =$ the ubiquitous constant, $ж_\theta =$ the hyperbolic radian constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{R}_\infty c = 3.28984196026036 \ldots \times 10^{15}$ Hz prediction
$\dot{R}_\infty c = 3.2898419602500(36) \times 10^{15}$ Hz CODATA 2022, $\sigma = +2.88$
$\dot{R}_\infty c = 3.2898419602508(64) \times 10^{15}$ Hz CODATA 2018, $\sigma = +1.49$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.13$

neutron-proton magnetic moment ratio 760.3(23)

$$\frac{\mu_n}{\mu_+} = -\frac{S}{C_{\text{CFP}}}\left(\frac{m_+}{m_n}\right)\left(1 + !\mathbf{5}\left(\frac{2\pi}{8K}\right)\text{ж}_r{}^2 \boxtimes\right)$$

Where S = Sierpiński's constant, C_{CFP} = the fixed point of the hyperbolic cotangent, m_+ = the proton mass, m_n = the neutron mass, $!n$ = the derangement function, π = Archimedes' constant, K = Catalan's constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_n/\mu_+ = -6.84979091085629\ldots \times 10^{-1}$ prediction
$\mu_n/\mu_+ = -6.8497935(16) \times 10^{-1}$ CODATA 2018, $\sigma = +1.63$
$\mu_n/\mu_+ = -6.8497934(16) \times 10^{-1}$ CODATA 2022, $\sigma = -1.56$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.06$

proton-neutron magnetic moment ratio -760.3(23)

$$\frac{\mu_+}{\mu_n} = -\frac{C_{\text{CFP}}}{S}\left(\frac{m_n}{m_+}\right)\left(1 + !\mathbf{5}\left(\frac{2\pi}{8K}\right)\text{ж}_r{}^2 \boxtimes\right)^{-1}$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, S = Sierpiński's constant, m_n = the neutron mass, m_+ = the proton mass, $!n$ = the derangement function, π = Archimedes' constant, K = Catalan's constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_+/\mu_n = -1.45989857648807\ldots$ prediction
$\mu_+/\mu_n = -1.45989802(34)$ CODATA 2018, $\sigma = -1.64$
$\mu_+/\mu_n = -1.45989805(34)$ CODATA 2018, $\sigma = -1.55$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.09$

electron-neutron magnetic moment ratio 213.9(24)

$$\frac{\mu_e}{\mu_n} = \frac{C_{\text{CFP}}}{P_{up}} \left(\frac{m_n}{m_e} \right) \left(1 + 18 \left(\frac{4K}{2\pi} \right) ж_r{}^2 \boxtimes \right)$$

Where $C_{\text{CFP}} =$ the fixed point of the hyperbolic cotangent, $P_{up} =$ the universal parabolic constant, $m_n =$ the neutron mass, $m_e =$ the electron mass, $K =$ Catalan's constant, $\pi =$ Archimedes' constant, $ж_r =$ the hyperbolic radius constant, and $\boxtimes =$ the hyperbolic inversion boundary.

$\mu_e/\mu_n = 9.60920149475115 \ldots \times 10^2$ prediction
$\mu_e/\mu_n = 9.6092048(23) \times 10^2$ CODATA 2022, $\sigma = -1.44$
$\mu_e/\mu_n = 9.6092050(23) \times 10^2$ CODATA 2018, $\sigma = -1.53$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.09$

neutron-electron magnetic moment ratio -213.9(24)

$$\frac{\mu_n}{\mu_e} = \frac{P_{up}}{C_{\text{CFP}}} \left(\frac{m_e}{m_n} \right) \left(1 + 18 \left(\frac{4K}{2\pi} \right) ж_r{}^2 \boxtimes \right)^{-1}$$

Where $P_{up} =$ the universal parabolic constant, $C_{\text{CFP}} =$ the fixed point of the hyperbolic cotangent, $m_e =$ the electron mass, $m_n =$ the neutron mass, $K =$ Catalan's constant, $\pi =$ Archimedes' constant, $ж_r =$ the hyperbolic radius constant, and $\boxtimes =$ the hyperbolic inversion boundary.

$\mu_n/\mu_e = 1.04066919665097 \ldots \times 10^{-3}$ prediction
$\mu_n/\mu_e = 1.04066884(24) \times 10^{-3}$ CODATA 2022, $\sigma = +1.49$
$\mu_n/\mu_e = 1.04066882(25) \times 10^{-3}$ CODATA 2018, $\sigma = +1.50$
$\Delta_{\text{precision}} = +0.02$
$\Delta_{\text{scaled}} = +0.04$

atomic unit of magnetic dipole moment 5.5204(31)

$$A_{\mathrm{mdm}} = ж_1 \left(\frac{{l_p}^2 \, q_p \, m_p}{t_p \, m_e} \right) \left(1 + \omega_2 \left(\frac{2\pi}{35} \right) {ж_r}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, ω_2 = the omega_2 constant, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\mathrm{mdm}} = 1.85480201153128 \ldots \times 10^{-23}$ J/T prediction
$A_{\mathrm{mdm}} = 1.85480201315(58) \times 10^{-23}$ J/T CODATA 2022, $\sigma = -2.79$
$A_{\mathrm{mdm}} = 1.85480201566(56) \times 10^{-23}$ J/T CODATA 2018, $\sigma = -7.37$
$\Delta_{\mathrm{precision}} = -0.02$
$\Delta_{\mathrm{scaled}} = -4.48$

Bohr magneton 5.5208(31)

$$\mu_B = \frac{ж_1}{2} \left(\frac{{l_p}^2 \, q_p \, m_p}{t_p \, m_e} \right) \left(1 + \omega_2 \left(\frac{2\pi}{35} \right) {ж_r}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, ω_2 = the omega_2 constant, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_B = 9.27401005765638 \ldots \times 10^{-24}$ J/T prediction
$\mu_B = 9.2740100657(29) \times 10^{-24}$ J/T CODATA 2022, $\sigma = -2.77$
$\mu_B = 9.2740100783(28) \times 10^{-24}$ J/T CODATA 2018, $\sigma = -7.37$
$\Delta_{\mathrm{precision}} = -0.02$
$\Delta_{\mathrm{scaled}} = -4.50$

nuclear magneton 5.5208(31)

$$\mu_N = \frac{ж_1}{2}\left(\frac{{l_p}^2\, q_p\, m_p}{t_p\, m_+}\right)\left(1 + \omega_2\left(\frac{2\pi}{35}\right) {ж_r}^2 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_+ = the proton mass, ω_2 = the omega_2 constant, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_N = 5.05078373489248\ldots \times 10^{-27}$ J/T prediction
$\mu_N = 5.0507837393(16) \times 10^{-27}$ J/T CODATA 2022, $\sigma = -2.75$
$\mu_N = 5.0507837461(15) \times 10^{-27}$ J/T CODATA 2018, $\sigma = -7.47$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = -4.53$

triton magnetic moment −10.716(20)

$$\mu_{\text{tri}} = {ж_1}^2\, {ж_2}^2\, (D_{\text{Do}} + \pi)\left(\frac{{l_p}^2\, q_p\, m_p}{t_p\, m_{\text{tri}}}\right)\left(1 - \omega_2\left(\frac{2\pi}{18}\right) {ж_r}^2 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, D_{Do} = the Dottie number, π = Archimedes' constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_{tri} = the triton mass, ω_2 = the omega_2 constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{tri}} = 1.50460951611437\ldots \times 10^{-26}$ J/T prediction
$\mu_{\text{tri}} = 1.5046095178(30) \times 10^{-26}$ J/T CODATA 2022, $\sigma = -0.56$
$\mu_{\text{tri}} = 1.5046095202(30) \times 10^{-26}$ J/T CODATA 2018, $\sigma = -1.36$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.80$

triton to proton magnetic moment ratio 308.242(19)

$$\frac{\mu_{\text{tri}}}{\mu_+} = S\left(D_{\text{Do}} + \pi\right)\left(\frac{m_+}{m_{\text{tri}}}\right)\left(1 + \frac{4}{L_{LL}}\left(\frac{32}{4\pi}\right)ж_r{}^2 \boxtimes\right)$$

Where $S =$ Sierpiński's constant, $D_{\text{Do}} =$ the Dottie number, $\pi =$ Archimedes' constant, $m_+ =$ the proton mass, $m_{\text{tri}} =$ the triton mass, $L_{LL} =$ the Laplace limit, $ж_r =$ the hyperbolic radius constant, and $\boxtimes =$ the hyperbolic inversion boundary.

$\mu_{\text{tri}}/\mu_+ = 1.06663991754137\ldots$ prediction
$\mu_{\text{tri}}/\mu_+ = 1.0666399189(21)$ CODATA 2022, $\sigma = -0.65$
$\mu_{\text{tri}}/\mu_+ = 1.0666399191(21)$ CODATA 2018, $\sigma = -0.74$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.10$

triton magnetic moment to nuclear magneton ratio -16.237(20)

$$\frac{\mu_{\text{tri}}}{\mu_N} = ж_1\, ж_2{}^2\left(2D_{\text{Do}} + 2\pi\right)\left(\frac{m_+}{m_{\text{tri}}}\right)\left(1 - \frac{18}{8}\left(\frac{4\pi}{35}\right)ж_r{}^2 \boxtimes\right)$$

Where $ж_1 =$ the 1st hyperbolic partition constant, $ж_2 =$ the 2nd hyperbolic partition constant, $D_{\text{Do}} =$ the Dottie number, $\pi =$ Archimedes' constant, $m_+ =$ the proton mass, $m_{\text{tri}} =$ the triton mass, $ж_r =$ the hyperbolic radius constant, and $\boxtimes =$ the hyperbolic inversion boundary.

$\mu_{\text{tri}}/\mu_N = 2.97896247563036\ldots$ prediction
$\mu_{\text{tri}}/\mu_N = 2.9789624650(59)$ CODATA 2022, $\sigma = +1.80$
$\mu_{\text{tri}}/\mu_N = 2.9789624656(59)$ CODATA 2018, $\sigma = +1.70$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.10$

triton magnetic moment to Bohr magneton ratio -16.237(19)

$$\frac{\mu_{\text{tri}}}{\mu_B} = ж_1\, ж_2{}^2 \left(2D_{\text{Do}} + 2\pi \right)\left(\frac{m_e}{m_{\text{tri}}} \right)\left(1 - \frac{18}{8}\left(\frac{4\pi}{35} \right) ж_r{}^2\, ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, D_{Do} = the Dottie number, π = Archimedes' constant, m_e = the electron mass, m_{tri} = the triton mass, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{\text{tri}}/\mu_B = 1.62239367061578\ldots \times 10^{-3}$ prediction
$\mu_{\text{tri}}/\mu_B = 1.6223936648(32) \times 10^{-3}$ CODATA 2022, $\sigma = +1.82$
$\mu_{\text{tri}}/\mu_B = 1.6223936651(32) \times 10^{-3}$ CODATA 2018, $\sigma = +1.72$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.09$

triton g factor −16.236(20)

$$g_{\text{tri}} = ж_1\, ж_2{}^2 \left(4D_{\text{Do}} + 4\pi \right)\left(\frac{m_+}{m_{\text{tri}}} \right)\left(1 - \frac{18}{8}\left(\frac{4\pi}{35} \right) ж_r{}^2\, ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, D_{Do} = the Dottie number, π = Archimedes' constant, m_+ = the proton mass, m_{tri} = the triton mass, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$g_{\text{tri}} = 5.95792495126071\ldots$ prediction
$g_{\text{tri}} = 5.957924930(12)$ CODATA 2022, $\sigma = +1.77$
$g_{\text{tri}} = 5.957924931(12)$ CODATA 2018, $\sigma = -1.69$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.08$

electron-muon magnetic moment ratio -62.35(22)

$$\frac{\mu_e}{\mu_\mu} = \left(\frac{m_\mu}{m_e}\right)\left(1 - \left(\frac{4\pi}{18}\right) ж_r{}^3 ⊠\right)$$

Where m_μ = the muon mass, m_e = the electron mass, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_e/\mu_\mu = 2.0676698504132 3 \ldots \times 10^2$ prediction
$\mu_e/\mu_\mu = 2.067669881(46) \times 10^2$ CODATA 2022, $\sigma = +0.66$
$\mu_e/\mu_\mu = 2.067669883(46) \times 10^2$ CODATA 2018, $\sigma = -0.71$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.04$

Newtonian constant of gravitation -60.(103)

$$G = \left(\frac{l_p{}^3}{t_p{}^2\, m_p}\right)\left(1 - \left(\frac{4\pi}{18}\right) ж_r{}^3 ⊠\right)$$

Where l_p = the Planck length, t_p = the Planck time, m_p = the Planck mass, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and ⊠= the hyperbolic inversion boundary.

$G = 6.67430315504533 \ldots \times 10^{-11}\ \text{m}^3/\text{s}^2 \cdot \text{kg}$ prediction
$G = 6.67430(15) \times 10^{-11}\ \text{m}^3/\text{s}^2 \cdot \text{kg}$ CODATA 2022, $\sigma = +0.02$
$G = 6.67430(15) \times 10^{-11}\ \text{m}^3/\text{s}^2 \cdot \text{kg}$ CODATA 2018, $\sigma = +0.02$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Also called the *gravitational constant*.

Newtonian constant of gravitation over h-bar c -70 ±223

$$\frac{G}{\hbar c} = \mathrm{GeV}^2 \left(\frac{{t_p}^4}{{l_p}^4\, {m_p}^2} \right) \left(1 - \left(\frac{4\pi}{18} \right) {ж_r}^3 \boxtimes \right)$$

Where GeV = the gigaelectron volt, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, π = Archimedes' constant, $ж_r$ = the hyperbolic radius constant, and ⊠= the hyperbolic inversion boundary.

$G/\hbar c = 6.708882525604658 \ldots \times 10^{-39}\ \mathrm{c}^4/\mathrm{GeV}^2$ prediction
$G/\hbar c = 6.70883(15) \times 10^{-39}\ \mathrm{c}^4/\mathrm{GeV}^2$ CODATA 2022, $\sigma = -0.03$
$G/\hbar c = 6.70883(15) \times 10^{-39}\ \mathrm{c}^4/\mathrm{GeV}^2$ CODATA 2018, $\sigma = -0.03$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

The Planck energy is equal to $E_p = \frac{{l_p}^2\, m_p}{{t_p}^2}$.

neutron mass −74.9526(39)

$$m_n = \left(\frac{2\pi}{2s}\right)^2 \frac{\text{GeV}}{\varphi^{-2}} \left(\frac{{t_p}^2}{{l_p}^2}\right)\left(1 - \left(\frac{2s}{4\pi}\right) {ж_r}^3 \boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, GeV = the gigaelectron volt, φ = the golden ratio, t_p = the Planck time, l_p = the Planck length, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_n = 1.67492749887876 \ldots \times 10^{-27}$ kg prediction
$m_n = 1.67492750056(85) \times 10^{-27}$ kg CODATA 2022, $\sigma = -1.98$
$m_n = 1.67492749804(95) \times 10^{-27}$ kg CODATA 2018, $\sigma = +0.88$
$\Delta_{\text{precision}} = +0.05$
$\Delta_{\text{scaled}} = +2.65$

proton mass −179.826407(84)

$$m_+ = \left(\frac{2\pi}{s}\right)^2 \frac{\text{GeV}}{\omega_2} \left(\frac{{t_p}^2}{{l_p}^2}\right)\left(1 - \frac{\sqrt{2}}{e^{\gamma/3}} \left(\frac{18}{2s}\right) {ж_r}^3 \boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, GeV = the gigaelectron volt, ω_2 = the omega_2 constant, t_p = the Planck time, l_p = the Planck length, e = Euler's number, γ = the Euler-Mascheroni constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_+ = 1.6726219225165 \ldots \times 10^{-27}$ kg prediction
$m_+ = 1.67262192595(52) \times 10^{-27}$ kg CODATA 2022, $\sigma = -1.34$
$m_+ = 1.67262192369(51) \times 10^{-27}$ kg CODATA 2018, $\sigma = +3.06$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.35$

deuteron mass 130.771469(75)

$$m_{\mathrm{de}} = \frac{18}{6\,C_{R1}} \sqrt{\frac{2\pi}{14}} \left(\mathrm{A}_{\mathrm{mass}} \right) \left(1 + \left(\pi - x_\infty \right) \left(\frac{18}{2s} \right) ж_r{}^3 \boxtimes \right)$$

Where C_{R1} = Ramanujan's 1st continued fraction constant, π = Archimedes' constant, $\mathrm{A}_{\mathrm{mass}}$ = the atomic mass constant, x_∞ = the 1st Foias constant, s = the arc length of the unit lemniscate, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_{\mathrm{de}} = 3.343583775363566 \ldots \times 10^{-27}$ kg prediction
$m_{\mathrm{de}} = 3.3435837768(10) \times 10^{-27}$ kg CODATA 2022, $\sigma = -1.44$
$m_{\mathrm{de}} = 3.3435837724(10) \times 10^{-27}$ kg CODATA 2018, $\sigma = +2.96$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +4.40$

muon mass −1869.61(23)

$$m_\mu = \frac{2\pi}{35} \sqrt{\frac{4\pi}{6s}} \left(\mathrm{A}_{\mathrm{mass}} \right) \left(1 - 18\,K_{-6}\, ж_r{}^3 \boxtimes \right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, $\mathrm{A}_{\mathrm{mass}}$ = the atomic mass constant, K_{-6} = the Khinchin mean of order −6, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\mu = 1.883531615023 63 \ldots \times 10^{-28}$ kg prediction
$m_\mu = 1.883531627(42) \times 10^{-28}$ kg CODATA 2022, $\sigma = -0.29$
$m_\mu = 1.883531627(42) \times 10^{-28}$ kg CODATA 2018, $\sigma = -0.29$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

deuteron-electron magnetic moment ratio -1851.087(25)

$$\frac{\mu_{\text{de}}}{\mu_e} = -P_{up}\sqrt{\frac{2s}{6\pi}}\left(\frac{m_e}{m_{\text{de}}}\right)\left(1 - 18\sqrt{L_1}\,ж_r{}^3\,\boxtimes\right)$$

Where P_{up} = the universal parabolic constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, m_e = the electron mass, m_{de} = the deuteron mass, L_1 = the 1st lemniscate constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{de}}/\mu_e = -4.66434558972163 \ldots \times 10^{-4}$ prediction
$\mu_{\text{de}}/\mu_e = -4.664345550(12) \times 10^{-4}$ CODATA 2022, $\sigma = -3.31$
$\mu_{\text{de}}/\mu_e = -4.664345551(12) \times 10^{-4}$ CODATA 2018, $\sigma = -3.23$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.08$

electron-deuteron magnetic moment ratio 1851.431(26)

$$\frac{\mu_e}{\mu_{\text{de}}} = -\frac{1}{P_{up}}\sqrt{\frac{6\pi}{2s}}\left(\frac{m_{\text{de}}}{m_e}\right)\left(1 - 18\sqrt{L_1}\,ж_r{}^3\,\boxtimes\right)^{-1}$$

Where P_{up} = the universal parabolic constant, π = Archimedes' constant, s = the arc length of the unit lemniscate, m_{de} = the deuteron mass, m_e = the electron mass, L_1 = the 1st lemniscate constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_e/\mu_{\text{de}} = -2.14392347386009 \ldots \times 10^3$ prediction
$\mu_e/\mu_{\text{de}} = -2.1439234921(56) \times 10^3$ CODATA 2022, $\sigma = +3.26$
$\mu_e/\mu_{\text{de}} = -2.1439234915(56) \times 10^3$ CODATA 2018, $\sigma = 3.15$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.11$

deuteron-proton magnetic moment ratio -876.881(26)

$$\frac{\mu_{\text{de}}}{\mu_{+}} = S\sqrt{\frac{2s}{6\pi}\left(\frac{m_{+}}{m_{\text{de}}}\right)\left(1-\frac{!5}{\varphi}\left(\frac{4\pi}{35}\right)ж_{r}{}^{3}\boxtimes\right)}$$

Where S = Sierpiński's constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, m_{+} = the proton mass, m_{de} = the deuteron mass, $!n$ = the derangement function, φ = the golden ratio, $ж_{r}$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{de}}/\mu_{+} = 3.0701220990825\ldots\times10^{-1}$ prediction
$\mu_{\text{de}}/\mu_{+} = 3.0701220930(79)\times10^{-1}$ CODATA 2022, $\sigma = +0.11$
$\mu_{\text{de}}/\mu_{+} = 3.0701220939(79)\times10^{-1}$ CODATA 2018, $\sigma = +0.00$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.11$

deuteron-neutron magnetic moment ratio -1637.0(25)

$$\frac{\mu_{\text{de}}}{\mu_{n}} = -C_{\text{CFP}}\sqrt{\frac{2s}{6\pi}\left(\frac{m_{n}}{m_{\text{de}}}\right)\left(1-35\,Im(\omega_{1})\left(\frac{4\pi}{32}\right)ж_{r}{}^{3}\boxtimes\right)}$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, s = the arc length of the unit lemniscate, π = Archimedes' constant, m_{n} = the neutron mass, m_{de} = the deuteron mass, ω_{1} = the omega_1 constant, $ж_{r}$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{de}}/\mu_{n} = -4.48206589662326\ldots\times10^{-1}$ prediction
$\mu_{\text{de}}/\mu_{n} = -4.4820652(11)\times10^{-1}$ CODATA 2022, $\sigma = -0.63$
$\mu_{\text{de}}/\mu_{n} = -4.4820653(11)\times10^{-1}$ CODATA 2018, $\sigma = -0.54$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -0.09$

deuteron magnetic moment -1195.796(25)

$$\mu_{\rm de} = ж_1{}^2\, ж_2{}^2 \sqrt{\frac{2s}{6\pi}\left(\frac{l_p{}^2\, q_p\, m_p}{t_p\, m_{\rm de}}\right)}\left(1-\frac{8}{\omega_2}\left(\frac{32}{4\pi}\right) ж_r{}^3\, ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = 2nd hyperbolic partition constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, $m_{\rm de}$ = the deuteron mass, ω_2 = the omega_2 constant, $ж_r$ = the hyperbolic radius constant, and ⊠= the hyperbolic inversion boundary.

$\mu_{\rm de} = 4.33073505993240 \times 10^{-27}$ J/T prediction
$\mu_{\rm de} = 4.330735087(11) \times 10^{-27}$ J/T CODATA 2022, $\sigma = -2.46$
$\mu_{\rm de} = 4.330735094(11) \times 10^{-27}$ J/T CODATA 2018, $\sigma = -3.10$
$\Delta_{\rm precision} = +0.00$
$\Delta_{\rm scaled} = -0.63$

shielded helion magnetic moment to Bohr magneton ratio

347.5705(81)

$$\frac{\mu_{\text{he}}'}{\mu_B} = -\frac{1}{2}\sqrt{\frac{1}{4\pi}\frac{1}{4s}}\left(\frac{m_\mu}{m_{\text{he}}}\right)\left(1+\frac{1}{\sqrt{7}}\left(\frac{2\pi}{3K}\right)ж_r{}^4 ⊠\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, m_μ = the muon mass, m_{he} = the helion mass, K = Catalan's constant, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{\text{he}}'/\mu_B = -1.15867149694878\ldots \times 10^{-3}$ prediction

$\mu_{\text{he}}'/\mu_B = -1.15867149457(94) \times 10^{-3}$ CODATA 2022, $\sigma = -2.53$

$\mu_{\text{he}}'/\mu_B = -1.158671471(14) \times 10^{-3}$ CODATA 2018, $\sigma = -1.85$

$\Delta_{\text{precision}} = +2.17$

$\Delta_{\text{scaled}} = +1.64$

shielded helion magnetic moment to nuclear magneton ratio

347.5705(81)

$$\frac{\mu_{\text{he}}'}{\mu_N} = -\frac{1}{2}\sqrt{\frac{1}{4\pi}\frac{1}{4s}}\left(\frac{m_+\, m_\mu}{m_e\, m_{\text{he}}}\right)\left(1+\frac{1}{\sqrt{7}}\left(\frac{2\pi}{3K}\right)ж_r{}^4 ⊠\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, m_+ = the proton mass, m_μ = the muon mass, m_e = the electron mass, m_{he} = the helion mass, K = Catalan's constant, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{\text{he}}'/\mu_N = -2.12749776673056\ldots$ prediction

$\mu_{\text{he}}'/\mu_N = -2.1274977624(17)$ CODATA 2022, $\sigma = -2.55$

$\mu_{\text{he}}'/\mu_N = -2.127497719(25)$ CODATA 2018, $\sigma = -2.07$

$\Delta_{\text{precision}} = +1.17$

$\Delta_{\text{scaled}} = +1.72$

helion g factor 947.298(19)

$$g_{\text{he}} = -\sqrt{\frac{1}{4\pi}\,\frac{1}{4s}}\left(\frac{m_+\,m_\mu}{m_e\,m_{\text{he}}}\right)\left(1 + 18\left(\frac{2K}{14}\right)\text{ж}_r{}^4\,\boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, m_+ = the proton mass, m_μ = the muon mass, m_e = the electron mass, m_{he} = the helion mass, K = Catalan's constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$g_{\text{he}} = -4.25525070422298\ldots$ prediction
$g_{\text{he}} = -4.2552506995(34)$ CODATA 2022, $\sigma = -1.39$
$g_{\text{he}} = -4.255250615(50)$ CODATA 2018, $\sigma = -1.78$
$\Delta_{\text{precision}} = +0.17$
$\Delta_{\text{scaled}} = +1.16$

helion magnetic moment to nuclear magneton ratio 947.2981(82)

$$\frac{\mu_{\text{he}}}{\mu_N} = -\frac{1}{2}\sqrt{\frac{1}{4\pi}\,\frac{1}{4s}}\left(\frac{m_+\, m_\mu}{m_e\, m_{\text{he}}}\right)\left(1 + 18\left(\frac{2K}{14}\right){\text{ж}_r}^4\,\boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, m_+ = the proton mass, m_μ = the muon mass, m_e = the electron mass, m_{he} = the helion mass, K = Catalan's constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{he}}/\mu_N = -2.12762535211149$ prediction
$\mu_{\text{he}}/\mu_N = -2.1276253498(17)$ CODATA 2018, $\sigma = -1.36$
$\mu_{\text{he}}/\mu_N = -2.127625307(25)$ CODATA 2018, $\sigma = -1.80$
$\Delta_{\text{precision}} = +1.17$
$\Delta_{\text{scaled}} = +1.16$

helion magnetic moment to Bohr magneton ratio 947.2981(82)

$$\frac{\mu_{\text{he}}}{\mu_B} = -\frac{1}{2}\sqrt{\frac{1}{4\pi}\,\frac{1}{4s}}\left(\frac{m_\mu}{m_{\text{he}}}\right)\left(1 + 18\left(\frac{2K}{14}\right){\text{ж}_r}^4\,\boxtimes\right)$$

Where π = Archimedes' constant, s = the arc length of the unit lemniscate, m_μ = the muon mass, m_{he} = the helion mass, K = Catalan's constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{he}}/\mu_B = -1.15874098211893\ldots \times 10^{-3}$ prediction
$\mu_{\text{he}}/\mu_B = -1.15874098083(94) \times 10^{-3}$ CODATA 2022, $\sigma = -1.37$
$\mu_{\text{he}}/\mu_B = -1.158740958(14) \times 10^{-3}$ CODATA 2018, $\sigma = -1.72$
$\Delta_{\text{precision}} = +1.17$
$\Delta_{\text{scaled}} = +1.57$

vacuum magnetic permeability 8.0057(15)

$$\mu_0 = 4\pi \left(\frac{l_p\, m_p}{{q_p}^2} \right) \left(1 + \frac{G_{Ga}}{28} \left(\frac{14}{4s} \right) {\text{ж}_r}^4 \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, q_p = the Planck charge, G_{Ga} = Gauss's constant, s = the arc length of the unit lemniscate, ж_r = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_0 = 1.2566370615824\text{9} \ldots \times 10^{-6}\ \mathrm{N/A^2}$	prediction
$\mu_0 = 1.25663706127(20) \times 10^{-6}\ \mathrm{N/A^2}$	CODATA 2022, $\sigma = +1.56$
$\mu_0 = 1.25663706212(19) \times 10^{-6}\ \mathrm{N/A^2}$	CODATA 2018, $\sigma = -2.83$
	$\Delta_{\text{precision}} = -0.02$
	$\Delta_{\text{scaled}} = -4.47$

Also called the *permeability of free space*, or the *magnetic constant*.

electron mass 268.4338(18)

$$m_e = 2\mathrm{V_{fe}} \left(\frac{{m_p}^4}{\mathrm{kg}^3} \right) \left(1 + \left(\frac{14}{4s} \right) {\text{ж}_r}^4 \boxtimes \right)$$

Where $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, m_P = the Planck mass, kg = the kilogram, s = the arc length of the unit lemniscate, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_e = 9.10938371013637 \ldots \times 10^{-31}\ \mathrm{kg}$	prediction
$m_e = 9.1093837139(28) \times 10^{-31}\ \mathrm{kg}$	CODATA 2022, $\sigma = -1.34$
$m_e = 9.1093837015(28) \times 10^{-31}\ \mathrm{kg}$	CODATA 2018, $\sigma = +3.08$
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +4.42$

Also listed as the *atomic unit of mass*, and the *natural unit of mass*.

tau mass 258.(663)

$$m_\tau = \sqrt{\frac{35\,L_{LL}}{ж_1{}^6}}\sqrt{\frac{4s}{2\pi}}\left(\frac{m_p{}^4}{\mathrm{kg}^3}\right)\left(1+\left(\frac{14}{4s}\right)ж_r{}^4\boxtimes\right)$$

Where L_{LL} = the Laplace limit, $ж_1$ = the 1st hyperbolic partition constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, m_p = the Planck mass, kg = the kilogram, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\tau = 3.16754546668955\ldots\times 10^{-27}$ kg — prediction
$m_\tau = 3.16754(21)\times 10^{-27}$ kg — CODATA 2022, $\sigma = +0.03$
$m_\tau = 3.16754(21)\times 10^{-27}$ kg — CODATA 2018, $\sigma = +0.03$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

triton mass 964.90388(33)

$$m_{\text{tri}} = \frac{ж_1{}^{-5}}{18}\sqrt{\frac{4s}{2\pi}}\left(\frac{m_p{}^4}{\mathrm{kg}^3}\right)\left(1+\sqrt{\frac{G_{Ga}}{14}}\left(\frac{18}{2K}\right)ж_r{}^4\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, m_p = the Planck mass, kg = the kilogram, G_{Ga} = Gauss's constant, K = Catalan's constant, $ж_r$ = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_{\text{tri}} = 5.0073567486807 5\ldots\times 10^{-27}$ kg — prediction
$m_{\text{tri}} = 5.0073567512(16)\times 10^{-27}$ kg — CODATA 2022, $\sigma = -1.57$
$m_{\text{tri}} = 5.0073567446(15)\times 10^{-27}$ kg — CODATA 2018, $\sigma = +2.72$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = +4.40$

luminous efficacy 7564(7321)

$$K_{cd} = \frac{ж_1{}^{-7}}{f_1} \sqrt{\frac{4s}{2\pi}} \left(\frac{t_p{}^2}{l_p{}^2 \, \mathrm{A}_{\mathrm{mass}}} \right) \left(1 + \sqrt{\frac{G_{Ga}}{14}} \left(\frac{18}{2K} \right) ж_r{}^4 \, ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, f_1 = the frequency corresponding to the peak sensitivity wavelength where energy is maximally converted to light, s = the arc length of the unit lemniscate, π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, $\mathrm{A}_{\mathrm{mass}}$ = the atomic mass constant, G_{Ga} = Gauss's constant, K = Catalan's constant, $ж_r$ = the hyperbolic radius constant, and ⊠ = the hyperbolic inversion boundary.

$K_{cd} = 6.83002503039578 \ldots \times 10^2$ lm/W prediction
$K_{cd} = 6.83 \times 10^2$ lm/W CODATA 2022, 3-digit match
$K_{cd} = 6.83 \times 10^2$ lm/W CODATA 2018, 3-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

$f_1 = 540 \times 10^{12}$ hertz, corresponding to the peak sensitivity wavelength of 555 nm.

helion mass $-23.50214(24)$

$$m_{\text{he}} = \frac{36}{e^{\pi}} \sqrt{\frac{9s}{4\pi}} \left(\text{A}_{\text{mass}} \right) \left(1 - \sqrt{\frac{1}{14}} \left(\frac{x_\infty}{2s} \right) \text{ж}_r{}^4 \boxtimes \right)$$

Where e = Euler's number, π = Archimedes' constant, s = the arc length of the unit lemniscate, A_{mass} = the atomic mass constant, x_∞ = the 1st Foias constant, ж_r = the hyperbolic radius constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_{\text{he}} = 5.00641278404447 \ldots \times 10^{-27}$ kg	prediction
$m_{\text{he}} = 5.0064127862(16) \times 10^{-27}$ kg	CODATA 2022, $\sigma = -1.35$
$m_{\text{he}} = 5.0064127796(15) \times 10^{-27}$ kg	CODATA 2018, $\sigma = +2.92$
	$\Delta_{\text{precision}} - 0.03$
	$\Delta_{\text{scaled}} = +4.40$

alpha particle mass $-469.43891(15)$

$$m_{\alpha} = \frac{12}{\omega_2{}^4} \sqrt{\frac{4s}{2\pi}} \left(\text{A}_{\text{mass}} \right) \left(1 - \sqrt{\frac{32}{14}} \left(\frac{2\text{V}_{\text{fe}}}{x_\infty{}^2} \right) \text{ж}_r{}^4 \boxtimes \right)$$

Where ω_2 = the omega_2 constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, A_{mass} = the atomic mass constant, V_{fe} = the figure eight knot hyperbolic volume, x_∞ = the 1st Foias constant, ж_r = the hyperbolic radian constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_{\alpha} = 6.64465734214075 \ldots \times 10^{-27}$ kg	prediction
$m_{\alpha} = 6.6446573450(21) \times 10^{-27}$ kg	CODATA 2022, $\sigma = -1.36$
$m_{\alpha} = 6.6446573357(20) \times 10^{-27}$ kg	CODATA 2018, $\sigma = +3.22$
	$\Delta_{\text{precision}} = -0.02$
	$\Delta_{\text{scaled}} = +4.65$

Planck mass energy equivalent in GeV 28(114)

$$\dot{E}_p = \frac{\text{joule}}{\text{GeV}}\left(\frac{{l_p}^2\, m_p}{{t_p}^2}\right)\left(1 - \frac{1}{2} Re\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where GeV = the gigaelectron volt, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_p = 1.22088572754077 \ldots \times 10^{19}$ GeV prediction
$\dot{E}_p = 1.220890(14) \times 10^{19}$ GeV CODATA 2022, $\sigma = -0.31$
$\dot{E}_p = 1.220890(14) \times 10^{19}$ GeV CODATA 2018, $\sigma = -0.31$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

von Klitzing constant 4.3925(33)

$$R_K = \frac{2\pi}{{ж_1}^2}\left(\frac{{l_p}^2\, m_p}{t_p\, {q_p}^2}\right)\left(1 + \frac{1}{2} Re\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$R_K = 2.58128074493918 \ldots \times 10^4\ \Omega$ prediction
$R_K = 2.581280745 \times 10^4\ \Omega$ CODATA 2022, 10.63-digit match
$R_K = 2.581280745 \times 10^4\ \Omega$ CODATA 2018, 10.63-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Also listed as the *conventional value of von Klitzing constant*.

characteristic impedance of vacuum 4.3936(15)

$$Z_0 = 4\pi\left(\frac{{l_p}^2 m_p}{t_p\, {q_p}^2}\right)\left(1+\frac{1}{2}Re\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$Z_0 = 3.76730313712033 \ldots \times 10^2\ \Omega$ prediction
$Z_0 = 3.76730313412(59) \times 10^2\ \Omega$ CODATA 2022, $\sigma = +5.09$
$Z_0 = 3.76730313668(57) \times 10^2\ \Omega$ CODATA 2018, $\sigma = +0.77$
$\Delta_{\text{precision}} = -0.05$
$\Delta_{\text{scaled}} = -4.49$

Planck electric impedance 4.404(16)

$$Z_p = \left(\frac{{l_p}^2 m_p}{t_p\, {q_p}^2}\right)\left(1+\frac{1}{2}Re\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$Z_p = 2.99792458199153 \ldots \times 10^1\ \Omega$ prediction
$Z_p = 2.99792458(45) \times 10^1\ \Omega$ WolframAlpha 2022, $\sigma = +0.00$
$Z_p = 2.99792458(45) \times 10^1\ \Omega$ WolframAlpha 2018, $\sigma = +0.00$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

hertz-inverse meter relationship 3.6106(15)

$$\text{Hz} \vdots \frac{1}{\text{m}} = \left(\frac{t_p}{\text{s}\, l_p} \right) \left(1 + \frac{1}{2} Im \left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, ⊠ \right)$$

Where t_p = the Planck time, s = the second, l_p = the Planck length, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{Hz} \vdots 1/\text{m} = 3.33564095322875 \ldots \times 10^{-9}$ cycles/m — prediction
$\text{Hz} \vdots 1/\text{m} = 3.335640951 \times 10^{-9}$ cycles/m — CODATA 2022, 9.18-digit match
$\text{Hz} \vdots 1/\text{m} = 3.335640951 \times 10^{-9}$ cycles/m — CODATA 2018, 9.18-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

atomic unit of velocity -3.6170(15)

$$\text{A}_{\text{vel}} = {ж_1}^2 \left(\frac{l_p}{t_p} \right) \left(1 - \frac{1}{2} Im \left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{A}_{\text{vel}} = 2.18769126392058 \ldots \times 10^{6}$ m/s — prediction
$\text{A}_{\text{vel}} = 2.18769126216(34) \times 10^{6}$ m/s — CODATA 2022, $\sigma = +5.18$
$\text{A}_{\text{vel}} = 2.18769126364(33) \times 10^{6}$ m/s — CODATA 2018, $\sigma = +3.88$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = -4.48$

atomic unit of momentum -3.6171(15)

$$\mathrm{A}_{\mathrm{mom}} = ж_1{}^2 \left(\frac{l_p\, m_e}{t_p} \right) \left(1 - \frac{1}{2} Im \left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{A}_{\mathrm{mom}} = 1.99285191623658 \ldots \times 10^{-24}\ \mathrm{m \cdot kg/s}$ prediction
$\mathrm{A}_{\mathrm{mom}} = 1.99285191545(31) \times 10^{-24}\ \mathrm{m \cdot kg/s}$ CODATA 2018, $\sigma = +2.54$
$\mathrm{A}_{\mathrm{mom}} = 1.99285191410(30) \times 10^{-24}\ \mathrm{m \cdot kg/s}$ CODATA 2018, $\sigma = +7.12$
$\Delta_{\mathrm{precision}} = -0.03$
$\Delta_{\mathrm{scaled}} = +4.50$

natural unit of momentum -3.6121(30)

$$\mathcal{N}_{\mathrm{mom}} = \left(\frac{l_p\, m_e}{t_p} \right) \left(1 - \frac{1}{2} Im \left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, \boxtimes \right)$$

Where l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathcal{N}_{\mathrm{mom}} = 2.73092453230547 \ldots \times 10^{-22}\ \mathrm{m \cdot kg/s}$ prediction
$\mathcal{N}_{\mathrm{mom}} = 2.73092453446(85) \times 10^{-22}\ \mathrm{m \cdot kg/s}$ CODATA 2022, $\sigma = -2.53$
$\mathcal{N}_{\mathrm{mom}} = 2.73092453075(82) \times 10^{-22}\ \mathrm{m \cdot kg/s}$ CODATA 2018, $\sigma = +1.90$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = +4.52$

electron volt-kilogram relationship 7.22329(90)

$$\text{eV} \vdots \text{kg} = \text{eV}\left(\frac{{t_p}^2}{{l_p}^2}\right)\left(1 + Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where eV $=$ the electron-volt, t_p $=$ the Planck time, l_p $=$ the Planck length, i $=$ the imaginary unit, $ж_3$ $=$ the 3rd hyperbolic partition constant, $ж_4$ $=$ the 4th hyperbolic partition constant, and $\boxtimes$ $=$ the hyperbolic inversion boundary.

$\text{eV} \vdots \text{kg} = 1.78266192320573 \ldots \times 10^{-36}$ kg prediction
$\text{eV} \vdots \text{kg} = 1.782661921 \times 10^{-36}$ kg CODATA 2022, 9.91-digit match
$\text{eV} \vdots \text{kg} = 1.782661921 \times 10^{-36}$ kg CODATA 2018, 9.91-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

joule-kilogram relationship 7.22398(56)

$$\text{J} \vdots \text{kg} = \text{joule}\left(\frac{{t_p}^2}{{l_p}^2}\right)\left(1 + Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where t_p $=$ the Planck time, l_p $=$ the Planck length, i $=$ the imaginary unit, $ж_3$ $=$ the 3rd hyperbolic partition constant, $ж_4$ $=$ the 4th hyperbolic partition constant, and $\boxtimes$ $=$ the hyperbolic inversion boundary.

$\text{J} \vdots \text{kg} = 1.11265005688553 \ldots \times 10^{-17}$ kg prediction
$\text{J} \vdots \text{kg} = 1.112650056 \times 10^{-17}$ kg CODATA 2022, 10-digit match
$\text{J} \vdots \text{kg} = 1.112650056 \times 10^{-17}$ kg CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

joule-atomic mass unit relationship 7.2242(30)

$$\mathrm{J} \vdots \mathrm{A_{mass}} = \mathrm{joule}\left(\frac{{t_p}^2}{{l_p}^2\ \mathrm{A_{mass}}}\right)\left(1 + Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right)\ ж_3\ ж_4\ \boxtimes\right)$$

Where t_p = the Planck time, l_p = the Planck length, $\mathrm{A_{mass}}$ = the atomic mass constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{J} \vdots \mathrm{A_{mass}} = 6.7005352549926 4 \ldots \times 10^9$ u prediction
$\mathrm{J} \vdots \mathrm{A_{mass}} = 6.7005352471(21) \times 10^9$ u CODATA 2022, $\sigma = +3.77$
$\mathrm{J} \vdots \mathrm{A_{mass}} = 6.7005352565(20) \times 10^9$ u CODATA 2018, $\sigma = -0.75$
$\Delta_{\mathrm{precision}} = -0.04$
$\Delta_{\mathrm{scaled}} = -4.70$

atomic mass unit-joule relationship -7.2242(30)

$$\mathrm{A_{mass}} \vdots \mathrm{J} = \left(\frac{{l_p}^2\ \mathrm{A_{mass}}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right)\ ж_3\ ж_4\ \boxtimes\right)$$

Where l_p = the Planck length, $\mathrm{A_{mass}}$ = the atomic mass constant, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{A_{mass}} \vdots \mathrm{J} = 1.49241808593480 \ldots \times 10^{-10}$ J prediction
$\mathrm{A_{mass}} \vdots \mathrm{J} = 1.49241808768(46) \times 10^{-10}$ J CODATA 2022, $\sigma = -3.79$
$\mathrm{A_{mass}} \vdots \mathrm{J} = 1.49241808560(45) \times 10^{-10}$ J CODATA 2018, $\sigma = +0.74$
$\Delta_{\mathrm{precision}} = -0.00$
$\Delta_{\mathrm{scaled}} = +4.62$

Also listed as the *atomic mass constant energy equivalent*.

natural unit of momentum in MeV/c -7.2227(29)

$$\dot{\mathcal{N}}_{\text{mom}} = \frac{\text{joule}}{\text{MeV}}\left(\frac{\text{s}\, {l_p}^2\, m_e}{{t_p}^2\, \text{m}}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where MeV = the megaelectron-volt, s = the second, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, m = the meter, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\mathcal{N}}_{\text{mom}} = 5.10998950028076\ldots \times 10^{-1}$ MeV/c — prediction
$\dot{\mathcal{N}}_{\text{mom}} = 5.1099895069(16) \times 10^{-1}$ MeV/c — CODATA 2022, $\sigma = -4.14$
$\dot{\mathcal{N}}_{\text{mom}} = 5.1099895000(15) \times 10^{-1}$ MeV/c — CODATA 2018, $\sigma = +0.19$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = +4.60$

atomic mass constant energy equivalent in MeV -7.2227(30)

$$\dot{\text{E}}_{\text{A}_{\text{mass}}} = \frac{1}{\text{MeV}}\left(\frac{{l_p}^2\, \text{A}_{\text{mass}}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, A_{mass} = the atomic mass constant, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\text{E}}_{\text{A}_{\text{mass}}} = 9.31494102497143\ldots \times 10^{2}$ MeV — prediction
$\dot{\text{E}}_{\text{A}_{\text{mass}}} = 9.3149410372(29) \times 10^{2}$ MeV — CODATA 2022, $\sigma = -4.22$
$\dot{\text{E}}_{\text{A}_{\text{mass}}} = 9.3149410242(28) \times 10^{2}$ MeV — CODATA 2018, $\sigma = -0.25$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.64$

kilogram-joule relationship -7.22398(56)

$$\text{kg} \vdots \text{J} = \left(\frac{{l_p}^2 \,\text{kg}}{{t_p}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, ⊠ \right)$$

Where l_p = the Planck length, kg = the kilogram, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

kg ⋮ J = 8.98755178064359 ... × 10^{16} J prediction
kg ⋮ J = 8.987551787 × 10^{16} J CODATA 2022, 9.15-digit match
kg ⋮ J = 8.987551787 × 10^{16} J CODATA 2018, 9.15-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kilogram-electron volt relationship -7.22329(90)

$$\text{kg} \vdots \text{eV} = \frac{\text{joule}}{\text{eV}} \left(\frac{{l_p}^2 \,\text{kg}}{{t_p}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, ⊠ \right)$$

Where eV = the electron-volt, l_p = the Planck length, kg = the kilogram, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

Kg ⋮ eV = 5.60958859883646 ... × 10^{35} eV prediction
kg ⋮ eV = 5.609588603 × 10^{35} eV CODATA 2022, 9.13-digit match
kg ⋮ eV = 5.609588603 × 10^{35} eV CODATA 2018, 9.13-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

neutron-proton mass difference energy equivalent -7.9(35)

$$E_{\Delta} = \left(m_n - m_+ \right) \left(\frac{{l_p}^2}{{t_p}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, \boxtimes \right)$$

Where m_n = the neutron mass, m_+ = the proton mass, l_p = the Planck length, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$E_{\Delta} = 2.07214623577065 \ldots \times 10^{-13}$ J — prediction
$E_{\Delta} = 2.07214712(60) \times 10^{-13}$ J — CODATA 2022, $\sigma = -1.47$
$E_{\Delta} = 2.07214689(74) \times 10^{-13}$ J — CODATA 2018, $\sigma = -0.88$
$\Delta_{\text{precision}} = +0.09$
$\Delta_{\text{scaled}} = +0.31$

neutron-proton mass difference energy equivalent in MeV -7.9(52)

$$\dot{E}_{\Delta} = \frac{\text{joule}}{\text{MeV}} \left(m_n - m_+ \right) \left(\frac{{l_p}^2}{{t_p}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3\, ж_4\, \boxtimes \right)$$

Where, MeV = the megaelectron-volt, m_n = the neutron mass, m_+ = the proton mass, l_p = the Planck length, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\dot{E}_{\Delta} = 1.29333195323950 \ldots$ MeV — prediction
$\dot{E}_{\Delta} = 1.29333251(38)$ MeV — CODATA 2022, $\sigma = -1.47$
$\dot{E}_{\Delta} = 1.29333236(46)$ MeV — CODATA 2018, $\sigma = -0.88$
$\Delta_{\text{precision}} = +0.11$
$\Delta_{\text{scaled}} = +0.32$

natural unit of energy in MeV -7.2227(29)

$$\dot{\mathrm{E}}_e = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_e}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{\cdot^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\mathrm{E}}_e = 5.10998950028076 \ldots \times 10^{-1}$ MeV — prediction
$\dot{\mathrm{E}}_e = 5.1099895069(16) \times 10^{-1}$ MeV — CODATA 2022, $\sigma = -4.14$
$\dot{\mathrm{E}}_e = 5.1099895000(15) \times 10^{-1}$ MeV — CODATA 2018, $\sigma = +0.19$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = +4.60$

Also listed as the *electron mass energy equivalent in MeV*.

muon mass energy equivalent in MeV -7.20(21)

$$\dot{\mathrm{E}}_\mu = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_\mu}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{\cdot^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_μ = the muon mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\mathrm{E}}_\mu = 1.05658374731846 \ldots \times 10^{2}$ MeV — prediction
$\dot{\mathrm{E}}_\mu = 1.056583755(23) \times 10^{2}$ MeV — CODATA 2022, $\sigma = -0.33$
$\dot{\mathrm{E}}_\mu = 1.056583755(23) \times 10^{2}$ MeV — CODATA 2018, $\sigma = -0.33$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

proton mass energy equivalent in MeV -7.2229(31)

$$\dot{E}_+ = \frac{\text{joule}}{\text{MeV}}\left(\frac{l_p{}^2\, m_+}{t_p{}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_+ = the proton mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_+ = 9.38272088205557 \ldots \times 10^2$ MeV	prediction
$\dot{E}_+ = 9.3827208943(29) \times 10^2$ MeV	CODATA 2022, $\sigma = -4.22$
$\dot{E}_+ = 9.3827208816(29) \times 10^2$ MeV	CODATA 2018, $\sigma = +0.16$
	$\Delta_{\text{precision}} = -0.01$
	$\Delta_{\text{scaled}} = +4.37$

neutron mass energy equivalent in MeV -7.2239(58)

$$\dot{E}_n = \frac{\text{joule}}{\text{MeV}}\left(\frac{l_p{}^2\, m_n}{t_p{}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_n = the neutron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_n = 9.39565420158796 \ldots \times 10^2$ MeV	prediction
$\dot{E}_n = 9.3956542194(48) \times 10^2$ MeV	CODATA 2022, $\sigma = -3.71$
$\dot{E}_n = 9.3956542052(54) \times 10^2$ MeV	CODATA 2018, $\sigma = -0.67$
	$\Delta_{\text{precision}} = +0.08$
	$\Delta_{\text{scaled}} = +2.63$

tau energy equivalent -23.5(722)

$$\dot{E}_{\tau} = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_{\tau}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_τ = the tau mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_{\tau} = 1.77686269362378\ldots \times 10^3$ MeV prediction
$\dot{E}_{\tau} = 1.77686(12) \times 10^3$ MeV CODATA 2022, $\sigma = +0.02$
$\dot{E}_{\tau} = 1.77686(12) \times 10^3$ MeV CODATA 2018, $\sigma = +0.02$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

deuteron mass energy equivalent in MeV -7.2225(30)

$$\dot{E}_{\text{de}} = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_{\text{de}}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_{de} = the deuteron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_{\text{de}} = 1.87561294255340\ldots \times 10^3$ MeV prediction
$\dot{E}_{\text{de}} = 1.87561294500(58) \times 10^3$ MeV CODATA 2022, $\sigma = -4.22$
$\dot{E}_{\text{de}} = 1.87561294257(57) \times 10^3$ MeV CODATA 2018, $\sigma = +0.03$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = +4.26$

helion mass energy equivalent in MeV -7.2228(30)

$$\dot{E}_{\text{he}} = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_{\text{he}}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot^{\cdot}}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_{he} = the helion mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_{\text{he}} = 2.8083916\text{0744450}\ldots \times 10^3$ MeV prediction
$\dot{E}_{\text{he}} = 2.80839161112(88) \times 10^3$ MeV CODATA 2022, $\sigma = -4.18$
$\dot{E}_{\text{he}} = 2.80839160743(85) \times 10^3$ MeV CODATA 2018, $\sigma = +0.02$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.34$

triton mass energy equivalent in MeV -7.2221(30)

$$\dot{E}_{\text{trı}} = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_{\text{tri}}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot^{\cdot}}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_{tri} = the triton mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_{\text{trı}} = 2.80892113\text{277064}\ldots \times 10^3$ MeV prediction
$\dot{E}_{\text{trı}} = 2.80892113668(88) \times 10^3$ MeV CODATA 2018, $\sigma = -4.44$
$\dot{E}_{\text{trı}} = 2.80892113298(85) \times 10^3$ MeV CODATA 2018, $\sigma = -0.25$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = +4.35$

alpha particle mass energy equivalent in MeV -7.2235(30)

$$\dot{E}_{\alpha} = \frac{\text{joule}}{\text{MeV}}\left(\frac{{l_p}^2\, m_\alpha}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{\cdot^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, \boxtimes\right)$$

Where MeV = the megaelectron-volt, l_p = the Planck length, m_α = the alpha particle mass, l_p = the Planck length, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{E}_{\alpha} = 3.7273794\mathbf{0696477} \ldots \times 10^3$ MeV prediction

$\dot{E}_{\alpha} = 3.7273794118(12) \times 10^3$ MeV CODATA 2022, $\sigma = -4.03$

$\dot{E}_{\alpha} = 3.7273794066(11) \times 10^3$ MeV CODATA 2018, $\sigma = +0.33$

$\Delta_{\text{precision}} = -0.03$

$\Delta_{\text{scaled}} = +4.72$

electron mass energy equivalent -7.2241(30)

$$E_e = \left(\frac{l_p{}^2 \, m_e}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, ⊠ \right)$$

Where l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_e = 8.18710577846019 \ldots \times 10^{-14}$ J	prediction
$E_e = 8.1871057880(26) \times 10^{-14}$ J	CODATA 2018, $\sigma = -3.67$
$E_e = 8.1871057769(25) \times 10^{-14}$ J	CODATA 2018, $\sigma = +0.62$
	$\Delta_{\text{precision}} = -0.01$
	$\Delta_{\text{scaled}} = +4.44$

Also listed as the *natural unit of energy*.

muon mass energy equivalent -7.19(24)

$$E_\mu = \left(\frac{l_p{}^2 \, m_\mu}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, ⊠ \right)$$

Where l_p = the Planck length, m_μ = the muon mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_\mu = 1.69283379205041 \ldots \times 10^{-11}$ J	prediction
$E_\mu = 1.692833804(38) \times 10^{-11}$ J	CODATA 2022, $\sigma = -0.31$
$E_\mu = 1.692833804(38) \times 10^{-11}$ J	CODATA 2018, $\sigma = -0.31$
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +0.00$

proton mass energy equivalent -7.2242(31)

$$E_+ = \left(\frac{l_p{}^2 \, m_+}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{\cdot^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, \boxtimes \right)$$

Where l_p = the Planck length, m_+ = the proton mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$E_+ = 1.50327761626390 \ldots \times 10^{-10}$ J prediction
$E_+ = 1.50327761802(47) \times 10^{-10}$ J CODATA 2022, $\sigma = -3.74$
$E_+ = 1.50327761598(46) \times 10^{-10}$ J CODATA 2018, $\sigma = +0.62$
$\Delta_{\text{precision}} = -0.04$
$\Delta_{\text{scaled}} = +4.43$

neutron mass energy equivalent -7.2253(57)

$$E_n = \left(\frac{l_p{}^2 \, m_n}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{\cdot^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, \boxtimes \right)$$

Where l_p = the Planck length, m_n = the neutron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$E_n = 1.50534976249967 \ldots \times 10^{-10}$ J prediction
$E_n = 1.50534976514(76) \times 10^{-10}$ J CODATA 2022, $\sigma = -3.47$
$E_n = 1.50534976287(86) \times 10^{-10}$ J CODATA 2018, $\sigma = -0.43$
$\Delta_{\text{precision}} = +0.07$
$\Delta_{\text{scaled}} = +2.63$

tau mass energy equivalent -40(668)

$$E_\tau = \left(\frac{{l_p}^2\, m_\tau}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where l_p = the Planck length, m_τ = the tau mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_\tau = 2.84684788994152 \ldots \times 10^{-10}$ J prediction
$E_\tau = 2.84684(19) \times 10^{-10}$ J CODATA 2022, $\sigma = +0.04$
$E_\tau = 2.84684(19) \times 10^{-10}$ J CODATA 2018, $\sigma = +0.04$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

deuteron mass energy equivalent -7.2239(30)

$$E_{de} = \left(\frac{{l_p}^2\, m_{de}}{{t_p}^2}\right)\left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}}\right) ж_3\, ж_4\, ⊠\right)$$

Where l_p = the Planck length, m_{de} = the deuteron mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_{de} = 3.00506323139998 \ldots \times 10^{-10}$ J prediction
$E_{de} = 3.00506323491(94) \times 10^{-10}$ J CODATA 2022, $\sigma = -3.73$
$E_{de} = 3.00506323102(91) \times 10^{-10}$ J CODATA 2018, $\sigma = +0.42$
$\Delta_{\text{precision}} = -0.04$
$\Delta_{\text{scaled}} = +4.27$

helion mass energy equivalent -7.2243(31)

$$E_{\text{he}} = \left(\frac{l_p{}^2 \, m_{\text{he}}}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, ⊠ \right)$$

Where l_p = the Planck length, m_{he} = the helion mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_{\text{he}} = 4.49953941318757 \ldots \times 10^{-10}$ J — prediction

$E_{\text{he}} = 4.4995394185(14) \times 10^{-10}$ J — CODATA 2022, $\sigma = -3.79$

$E_{\text{he}} = 4.4995394125(14) \times 10^{-10}$ J — CODATA 2018, $\sigma = +0.49$

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +4.29$

triton mass energy equivalent -7.2234(31)

$$E_{\text{tri}} = \left(\frac{l_p{}^2 \, m_{\text{tri}}}{t_p{}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot}}}} \right) ж_3 \, ж_4 \, ⊠ \right)$$

Where l_p = the Planck length, m_{tri} = the triton mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_{\text{tri}} = 4.50038780629234 \ldots \times 10^{-10}$ J — prediction

$E_{\text{tri}} = 4.5003878119(14) \times 10^{-10}$ J — CODATA 2022, $\sigma = -4.01$

$E_{\text{tri}} = 4.5003878060(14) \times 10^{-10}$ J — CODATA 2018, $\sigma = +0.21$

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +4.21$

alpha particle mass energy equivalent -7.2247(30)

$$E_\alpha = \left(\frac{{l_p}^2 \, m_\alpha}{{t_p}^2} \right) \left(1 - Im\left(i^{i^{i^{\cdot^{\cdot^{\cdot}}}}} \right) ж_3 \, ж_4 \, ⊠ \right)$$

Where l_p = the Planck length, m_α = the alpha particle mass, t_p = the Planck time, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_\alpha = 5.97192019271236 \ldots \times 10^{-10}$ J prediction
$E_\alpha = 5.9719201997(19) \times 10^{-10}$ J CODATA 2022, $\sigma = -3.68$
$E_\alpha = 5.9719201914(18) \times 10^{-10}$ J CODATA 2018, $\sigma = +0.73$

$\Delta_{\text{precision}} = -0.01$

$\Delta_{\text{scaled}} = +4.61$

deuteron g factor -181.339(25)

$$g_{\mathrm{de}} = \frac{2\pi}{8K}\left(1 - 8\left(\frac{2\pi}{W_{\mathrm{We}}}\right) ж_1\, ж_3\, ж_4\, ⊠\right)$$

Where $\pi =$ Archimedes' constant, $K =$ Catalan's constant, $W_{\mathrm{We}} =$ the Weierstrass constant, $ж_1 =$ the 1st hyperbolic partition constant, $ж_3 =$ the 3rd hyperbolic partition constant, $ж_4 =$ the 4th hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$g_{\mathrm{de}} = 8.574382359607750 \ldots \times 10^{-1}$ prediction
$g_{\mathrm{de}} = 8.574382335(22) \times 10^{-1}$ CODATA 2022, $\sigma = +1.12$
$g_{\mathrm{de}} = 8.574382338(22) \times 10^{-1}$ CODATA 2018, $\sigma = +0.98$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -0.14$

deuteron magnetic moment to nuclear magneton ratio -181.339(26)

$$\frac{\mu_{\mathrm{de}}}{\mu_N} = \frac{2\pi}{8K}\left(1 - 8\left(\frac{2\pi}{W_{\mathrm{We}}}\right) ж_1\, ж_3\, ж_4\, ⊠\right)$$

Where $\pi =$ Archimedes' constant, $K =$ Catalan's constant, $W_{\mathrm{We}} =$ the Weierstrass constant, $ж_1 =$ the 1st hyperbolic partition constant, $ж_3 =$ the 3rd hyperbolic partition constant, $ж_4 =$ the 4th hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\mu_{\mathrm{de}}/\mu_N = 8.574382359607750 \times 10^{-1}$ prediction
$\mu_{\mathrm{de}}/\mu_N = 8.574382335(22) \times 10^{-1}$ CODATA 2022, $\sigma = +1.12$
$\mu_{\mathrm{de}}/\mu_N = 8.574382338(22) \times 10^{-1}$ CODATA 2018, $\sigma = +0.98$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -0.14$

deuteron magnetic moment to Bohr magneton ratio -1201.313(25)

$$\frac{\mu_{\mathrm{de}}}{\mu_B} = \frac{2\pi}{8K}\left(\frac{m_e}{m_+}\right)\left(1 - 8\left(\frac{2\pi}{W_{\mathrm{We}}}\right) ж_1\, ж_3\, ж_4\, ⊠\right)$$

Where $\pi =$ Archimedes' constant, $K =$ Catalan's constant, $W_{\mathrm{We}} =$ the Weierstrass constant, $ж_1 =$ the 1st hyperbolic partition constant, $ж_3 =$ the 3rd hyperbolic partition constant, $ж_4 =$ the 4th hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\mu_{\mathrm{de}}/\mu_B = 4.669754558182757 \times 10^{-4}$ prediction
$\mu_{\mathrm{de}}/\mu_B = 4.669754568(12) \times 10^{-4}$ CODATA 2022, $\sigma = +1.15$
$\mu_{\mathrm{de}}/\mu_B = 4.669754570(12) \times 10^{-4}$ CODATA 2018, $\sigma = +0.99$

$\Delta_{\mathrm{precision}} = +0.00$

$\Delta_{\mathrm{scaled}} = -0.17$

muon magnetic moment 717.99(23)

$$\mu_\mu = -\frac{ж_1{}^2\, ж_2{}^2}{P_{up}}\left(\frac{l_p{}^2\, q_p\, m_p}{t_p\, m_\mu}\right)\left(1 + \frac{4\pi}{\mathcal{L}_{\mathrm{Li}}}\,(\pi - 1)\, ж_1{}^2\, ж_3{}^2\, ж_4{}^2\, ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_μ = the muon mass, π = Archimedes' constant, $\mathcal{L}_{\mathrm{Li}}$ = Liouville's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_\mu = -4.49044833035195\ldots \times 10^{-26}$ J/T prediction
$\mu_\mu = -4.49044830(10) \times 10^{-26}$ J/T CODATA 2022, $\sigma = -0.30$
$\mu_\mu = -4.49044830(10) \times 10^{-26}$ J/T CODATA 2018, $\sigma = -0.30$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

electron magnetic moment anomaly -650.6071858(18)

$$a_e = \frac{2\, ж_1\, ж_2{}^2}{P_{up}} - 1\left(1 - \frac{35}{\mathcal{L}_{\mathrm{Li}}}\left(\frac{\sqrt{2}}{\mathrm{V_{fe}}}\right) ж_1{}^2\, ж_3{}^2\, ж_4{}^2\, ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, $\mathcal{L}_{\mathrm{Li}}$ = Liouville's constant, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$a_e = 1.15965218025405\ldots \times 10^{-3}$ prediction
$a_e = 1.15965218046(18) \times 10^{-3}$ CODATA 2022, $\sigma = -1.14$
$a_e = 1.15965218128(18) \times 10^{-3}$ CODATA 2018, $\sigma = -5.70$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -4.56$

muon magnetic moment anomaly -713.2916(41)

$$a_\mu = \frac{2\,ж_1\,ж_2{}^2}{P_{up}} - 1\left(1 - \frac{!5}{\sqrt{\mathcal{L}_{\text{Li}}}}\,(\,2K\,)\,ж_1{}^2\,ж_3{}^2\,ж_4{}^2\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, $!n$ = the derangement function, $\mathcal{L}_{\text{Li}}$ = Liouville's constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$a_\mu = 1.16592060110720\ldots \times 10^{-3}$	prediction
$a_\mu = 1.16592062(41) \times 10^{-3}$	CODATA 2022, $\sigma = -0.05$
$a_\mu = 1.16592089(63) \times 10^{-3}$	CODATA 2018, $\sigma = -0.46$
	$\Delta_{\text{precision}} = +0.18$
	$\Delta_{\text{scaled}} = -0.43$

muon g factor 712.5140(65)

$$g_\mu = -\frac{4\,ж_1\,ж_2{}^2}{P_{up}}\left(1 + \zeta(2)^{1/3}\left(\frac{35}{C_d}\right)ж_1{}^3\,ж_3{}^3\,ж_4{}^3\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, $\zeta(x)$ = the Riemann zeta function, C_d = the domino tiling constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$g_\mu = -2.00233184172840\ldots$	prediction
$g_\mu = -2.00233184123(82)$	CODATA 2022, $\sigma = -0.61$
$g_\mu = -2.0023318418(13)$	CODATA 2018, $\sigma = +0.06$
	$\Delta_{\text{precision}} = +1.80$
	$\Delta_{\text{scaled}} = +0.50$

muon magnetic moment to Bohr magneton ratio 712.48(22)

$$\frac{\mu_\mu}{\mu_B} = -\frac{2\,ж_1\,ж_2{}^2}{P_{up}}\left(\frac{m_e}{m_\mu}\right)\left(1+\zeta(2)^{1/3}\left(\frac{35}{C_d}\right)ж_1{}^3\,ж_3{}^3\,ж_4{}^3\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, m_e = the electron mass, m_μ = the muon mass, $\zeta(x)$ = the Riemann zeta function, C_d = the domino tiling constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_\mu/\mu_B = -4.8419705079118 7\ldots \times 10^{-3}$ prediction
$\mu_\mu/\mu_B = -4.84197048(11) \times 10^{-3}$ CODATA 2022, $\sigma = -0.25$
$\mu_\mu/\mu_B = -4.84197047(11) \times 10^{-3}$ CODATA 2018, $\sigma = -0.34$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.09$

muon magnetic moment to nuclear magneton ratio 712.48(22)

$$\frac{\mu_\mu}{\mu_N} = -\frac{2\,ж_1\,ж_2{}^2}{P_{up}}\left(\frac{m_+}{m_\mu}\right)\left(1+\zeta(2)^{1/3}\left(\frac{35}{C_d}\right)ж_1{}^3\,ж_3{}^3\,ж_4{}^3\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_μ = the muon mass, $\zeta(x)$ = the Riemann zeta function, C_d = the domino tiling constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_\mu/\mu_N = -8.89059709269183\ldots$ prediction
$\mu_\mu/\mu_N = -8.89059704(20)$ CODATA 2022, $\sigma = -0.26$
$\mu_\mu/\mu_N = -8.89059703(20)$ CODATA 2018, $\sigma = -0.31$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.05$

molar gas constant -236.35823(30)

$$R = \frac{6}{e^{\gamma}} \text{ж}_1{}^2 \left(\frac{l_p{}^2 \, \text{C}}{t_p{}^2 \, \text{m} \, q_p \, T_p} \right) \left(1 - \frac{8}{C_d} \text{ж}_1{}^4 \, \text{ж}_3{}^4 \, \text{ж}_4{}^4 \, \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, ж_1 = the 1st hyperbolic partition constant, l_p = the Planck length, C = the coulomb, t_p = the Planck time, m = the meter, q_p = the Planck charge, T_p = The Planck temperature, C_d = the domino tiling constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$R = 8.31446261978165 \ldots \text{ J/mol} \cdot \text{K}$ prediction
$R = 8.314462618 \text{ J/mol} \cdot \text{K}$ CODATA 2022, 9.67-digit match
$R = 8.314462618 \text{ J/mol} \cdot \text{K}$ CODATA 2018, 9.67-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

molar volume of ideal gas (273.15 K, 100 kPa) −236.357(02)

$$V_{m_0} = \frac{6}{e^{\gamma}} \text{ж}_1{}^2 \frac{T_0}{p_0} \left(\frac{l_p{}^2 \, \text{C}}{t_p{}^2 \, \text{m} \, q_p \, T_p} \right) \left(1 - \frac{8}{C_d} \text{ж}_1{}^4 \, \text{ж}_3{}^4 \, \text{ж}_4{}^4 \, \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, ж_1 = the 1st hyperbolic partition constant, $T_0 = 273.150000000000 \text{ K}$, $p_0 = 100.000000000000 \text{ kPa}$, l_p = the Planck length, C = the coulomb, t_p = the Planck time, m = the meter, q_p = the Planck charge, T_p = the Planck temperature, C_d = the domino tiling constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$V_{m_0} = 2.27109546459336 \ldots \times 10^{-2} \text{ m}^3/\text{mol}$ prediction
$V_{m_0} = 2.271095464 \times 10^{-2} \text{ m}^3/\text{mol}$ CODATA 2022, 10-digit match
$V_{m_0} = 2.271095464 \times 10^{-2} \text{ m}^3/\text{mol}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

molar volume of ideal gas (273.15 K, 101.325 kPa) −236.359(22)

$$V_{m_1} = \frac{6}{e^{\gamma}}\,ж_1{}^2\,\frac{T_0}{p_1}\left(\frac{l_p{}^2\,\mathrm{C}}{t_p{}^2\,\mathrm{m}\,q_p\,T_p}\right)\left(1-\frac{8}{C_d}\,ж_1{}^4\,ж_3{}^4\,ж_4{}^4\,⊠\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, $T_0 = 273.15000000000\,K$, $p_1 = 101.325000000000$ kPa, l_p = the Planck length, C = the coulomb, t_p = the Planck time, m = the meter, q_p = the Planck charge, T_p = the Planck temperature, C_d = the domino tiling constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$V_{m_1} = 2.241396954\,94040\ldots \times 10^{-2}\ \mathrm{m^3/mol}$ prediction
$V_{m_1} = 2.241396954 \times 10^{-2}\ \mathrm{m^3/mol}$ CODATA 2022, 10-digit match
$V_{m_1} = 2.241396954 \times 10^{-2}\ \mathrm{m^3/mol}$ CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

electron g factor 649.8958153(18)

$$g_e = -\frac{4\,ж_1\,ж_2{}^2}{P_{up}}\left(1 + C_{\mathrm{CFP}}{}^2\left(\frac{32}{D_d}\right)ж_1{}^6\,ж_3{}^6\,ж_4{}^6\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, C_{CFP} = the fixed point of the hyperbolic cotangent, D_d = the dimer constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$g_e = -2.002319304360\,65\ldots$ prediction
$g_e = -2.00231930436092(36)$ CODATA 2022, $\sigma = +0.74$
$g_e = -2.00231930436256(35)$ CODATA 2018, $\sigma = -5.46$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = -4.69$

electron magnetic moment to Bohr magneton ratio 649.8958153(18)

$$\frac{\mu_e}{\mu_B} = -\frac{2\,ж_1\,ж_2{}^2}{P_{up}}\left(1 + C_{\text{CFP}}{}^2\left(\frac{32}{D_d}\right)ж_1{}^6\,ж_3{}^6\,ж_4{}^6\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, C_{CFP} = the fixed point of the hyperbolic cotangent, D_d = the dimer constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_e/\mu_B = -1.0011596521803\underline{3}$ ... prediction
$\mu_e/\mu_B = -1.00115965218046(18)$ CODATA 2022, $\sigma = +0.74$
$\mu_e/\mu_B = -1.00115965218128(18)$ CODATA 2018, $\sigma = -5.28$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -4.56$

electron magnetic moment to nuclear magneton ratio 649.89584(17)

$$\frac{\mu_e}{\mu_N} = -\frac{2\,ж_1\,ж_2{}^2}{P_{up}}\left(\frac{m_+}{m_e}\right)\left(1 + C_{\text{CFP}}{}^2\left(\frac{32}{D_d}\right)ж_1{}^6\,ж_3{}^6\,ж_4{}^6\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_e = the electron mass, C_{CFP} = the fixed point of the hyperbolic cotangent, D_d = the dimer constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_e/\mu_N = -1.838281971866466 \ldots \times 10^3$ prediction
$\mu_e/\mu_N = -1.838281971877(32) \times 10^3$ CODATA 2022, $\sigma = +0.39$
$\mu_e/\mu_N = -1.83828197188(11) \times 10^3$ CODATA 2018, $\sigma = -0.14$
$\Delta_{\text{precision}} = +0.54$
$\Delta_{\text{scaled}} = -0.03$

electron magnetic moment 655.4130(32)

$$\mu_e = -\frac{ж_1{}^2\, ж_2{}^2}{P_{up}}\left(\frac{l_p{}^2\, q_p\, m_p}{t_p\, m_e}\right)\left(1+\sqrt{7}\left(\frac{8s}{4\pi}\right) ж_1{}^8\, ж_3{}^8\, ж_4{}^8 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_e = the electron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_e = -9.28476469207109 \ldots \times 10^{-24}$ J/T prediction
$\mu_e = -9.2847646917(29) \times 10^{-24}$ J/T CODATA 2022, $\sigma = -0.13$
$\mu_e = -9.2847647043(28) \times 10^{-24}$ J/T CODATA 2018, $\sigma = -4.37$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.50$

electron gyromagnetic ratio 650.2658(31)

$$\gamma_e = \frac{2\, ж_1{}^2\, ж_2{}^2}{P_{up}}\left(\frac{q_p}{m_e}\right)\left(1+7\left(\frac{3s}{4\pi}\right) ж_1{}^8\, ж_3{}^8\, ж_4{}^8 \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, q_p = the Planck charge, m_e = the electron mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\gamma_e = 1.76085962907620 \ldots \times 10^{11}$ 1/s · T prediction
$\gamma_e = 1.76085962784(55) \times 10^{11}$ 1/s · T CODATA 2022, $\sigma = +2.25$
$\gamma_e = 1.76085963023(53) \times 10^{11}$ 1/s · T CODATA 2018, $\sigma = -2.17$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = 4.51$

electron gyromagnetic ratio in MHz/T 650.2658(30)

$$\dot{\gamma}_e = \frac{ж_1{}^2\, ж_2{}^2}{\pi\, P_{up}} \frac{1}{\mathrm{MHz}} \left(\frac{q_p}{\mathrm{s}\, m_e} \right) \left(1 + \mathbf{7} \left(\frac{3s}{4\pi} \right) ж_1{}^8\, ж_3{}^8\, ж_4{}^8\, ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, π = Archimedes' constant, P_{up} = the universal parabolic constant, MHz = the mega hertz, q_p = the Planck charge, s = the second, m_e = the electron mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\gamma}_e = 2.80249514058438 \ldots \times 10^4$ MHz/T prediction
$\dot{\gamma}_e = 2.80249513861(87) \times 10^4$ MHz/T CODATA 2022, $\sigma = +2.27$
$\dot{\gamma}_e = 2.80249514242(85) \times 10^4$ MHz/T CODATA 2018, $\sigma = -2.16$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.48$

shielded proton gyromagnetic ratio in MHz/T -580.805(41)

$$\dot{\gamma_+}' = \frac{ж_1{}^2\, ж_2{}^2}{\pi\, S} \frac{1}{\mathrm{MHz}} \left(\frac{q_p}{\mathrm{s}\, m_+}\right) \left(1 - \sqrt{35}\left(\frac{7}{s}\right) ж_2\, ж_3\, ж_4\, \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, π = Archimedes' constant, S = Sierpiński's constant, MHz = the megahertz, q_p = the Planck charge, s = the second, m_+ = the proton mass, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\dot{\gamma_+}' = 4.2576385\mathbf{2810155} \ldots \times 10^1\ \mathrm{MHz/T}$ prediction
$\dot{\gamma_+}' = 4.257638543(17) \times 10^1\ \mathrm{MHz/T}$ CODATA 2022, $\sigma = -0.88$
$\dot{\gamma_+}' = 4.257638474(46) \times 10^1\ \mathrm{MHz/T}$ CODATA 2018, $\sigma = +1.18$
$\Delta_{\mathrm{precision}} = +0.44$
$\Delta_{\mathrm{scaled}} = +1.50$

shielded proton gyromagnetic ratio -580.799(41)

$$\gamma_+' = \frac{2\, ж_1{}^2\, ж_2{}^2}{S} \left(\frac{q_p}{m_+}\right) \left(1 - \sqrt{35}\left(\frac{7}{s}\right) ж_2\, ж_3\, ж_4\, \boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, q_p = the Planck charge, m_+ = the proton mass, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\gamma_+' = 2.67515318430494 \ldots \times 10^8\ 1/\mathrm{s} \cdot \mathrm{T}$ prediction
$\gamma_+' = 2.675153194(11) \times 10^8\ 1/\mathrm{s} \cdot \mathrm{T}$ CODATA 2022, $\sigma = -0.88$
$\gamma_+' = 2.675153151(29) \times 10^8\ 1/\mathrm{s} \cdot \mathrm{T}$ CODATA 2018, $\sigma = -0.33$
$\Delta_{\mathrm{precision}} = +0.53$
$\Delta_{\mathrm{scaled}} = +1.48$

shielded proton magnetic moment -575.655(41)

$$\mu_+{}' = \frac{ж_1{}^2\, ж_2{}^2}{S}\left(\frac{l_p{}^2 q_p\, m_p}{t_p\, m_+}\right)\left(1 + \frac{\sqrt{3 \cdot 35}}{M}\left(\frac{7}{s}\right) ж_2\, ж_3\, ж_4\, ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_+ = the proton mass, M = the Madelung constant, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\mu_+{}' = 1.4105705793979 8 \ldots \times 10^{-26}$ J/T prediction
$\mu_+{}' = 1.4105705830(58) \times 10^{-26}$ J/T CODATA 2022, $\sigma = -0.62$
$\mu_+{}' = 1.410570560(15) \times 10^{-26}$ J/T CODATA 2018, $\sigma = +1.29$

$\Delta_{\text{precision}} = +0.43$

$\Delta_{\text{scaled}} = +1.53$

proton magnetic moment to Bohr magneton ratio -324.4677(31)

$$\frac{\mu_+}{\mu_B} = \frac{2\,ж_1\,ж_2{}^2}{S}\left(\frac{m_e}{m_+}\right)\left(1 - 6\left(\frac{2\pi}{8K}\right)^2 ж_2\,ж_3\,ж_4\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, m_e = the electron mass, m_+ = the proton mass, π = Archimedes' constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_+/\mu_B = 1.5210322055243\ldots \times 10^{-3}$ prediction
$\mu_+/\mu_B = 1.52103220230(45) \times 10^{-3}$ CODATA 2022, $\sigma = +0.56$
$\mu_+/\mu_B = 1.52103220230(46) \times 10^{-3}$ CODATA 2018, $\sigma = +0.55$
$\Delta_{\text{precision}} = +0.01$
$\Delta_{\text{scaled}} = +0.00$

proton magnetic moment to nuclear magneton ratio -324.4678(29)

$$\frac{\mu_+}{\mu_N} = \frac{2\,ж_1\,ж_2{}^2}{S}\left(1 - 6\left(\frac{2\pi}{8K}\right)^2 ж_2\,ж_3\,ж_4\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, π = Archimedes' constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_+/\mu_N = 2.79284734506470\ldots$ prediction
$\mu_+/\mu_N = 2.79284734463(82)$ CODATA 2022, $\sigma = +0.53$
$\mu_+/\mu_N = 2.79284734463(82)$ CODATA 2018, $\sigma = +0.53$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

proton g factor -324.4677(18)

$$g_+ = \frac{4\,ж_1\,ж_2{}^2}{S}\left(1 - 6\left(\frac{2\pi}{8K}\right)^2 ж_2\,ж_3\,ж_4\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, π = Archimedes' constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$g_+ = 5.5856946\textcolor{green}{9012941}\ldots$ prediction
$g_+ = 5.5856946893(16)$ CODATA 2022, $\sigma = +0.52$
$g_+ = 5.5856946893(16)$ CODATA 2018, $\sigma = +0.52$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

neutron to shielded proton magnetic moment ratio 1017.2(23)

$$\frac{\mu_n}{\mu_+{}'} = -\frac{S}{C_{\mathrm{CFP}}}\left(\frac{m_+}{m_n}\right)\left(1+\sqrt{\mathbf{5}}\left(\frac{4\pi}{\mathrm{V_{fe}}}\right) ж_2\, ж_3\, ж_4\, \boxtimes\right)$$

Where S = Sierpiński's constant, C_{CFP} = the fixed point of the hyperbolic cotangent, m_+ = the proton mass, m_n = the neutron mass, π = Archimedes' constant, $\mathrm{V_{fe}}$ = the figure eight knot hyperbolic volume, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_n/\mu_+{}' = -6.84997004903262\ldots \times 10^{-1}$ prediction
$\mu_n/\mu_+{}' = -6.8499694(16) \times 10^{-1}$ CODATA 2022, $\sigma = -0.41$
$\mu_n/\mu_+{}' = -6.8499694(16) \times 10^{-1}$ CODATA 2018, $\sigma = -0.41$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

electron-proton magnetic moment ratio 974.3959(29)

$$\frac{\mu_e}{\mu_+} = -\frac{S}{P_{up}}\left(\frac{m_+}{m_e}\right)\left(1+\sqrt{\mathbf{7}}\left(\frac{4x_\infty}{2K}\right) ж_2\, ж_3\, ж_4\, \boxtimes\right)$$

Where S = Sierpiński's constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_e = the electron mass, x_∞ = the 1st Foias constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_e/\mu_+ = -6.58210687490440\ldots \times 10^{2}$ prediction
$\mu_e/\mu_+ = -6.5821068789(19) \times 10^{2}$ CODATA 2022, $\sigma = +2.10$
$\mu_e/\mu_+ = -6.5821068789(20) \times 10^{2}$ CODATA 2018, $\sigma = -2.00$
$\Delta_{\mathrm{precision}} = +0.02$
$\Delta_{\mathrm{scaled}} = +0.00$

electron to shielded proton magnetic moment ratio 1231.146(41)

$$\frac{\mu_e}{\mu_+'} = -\frac{S}{P_{up}}\left(\frac{m_+}{m_e}\right)\left(1 + \sqrt{5}\left(\frac{2K}{18}\right) ж_2{}^2\, ж_3{}^2\, ж_4{}^2 \boxtimes\right)$$

Where S = Sierpiński's constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_e = the electron mass, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_e/\mu_+' = -6.58227587029051\ldots \times 10^2$ prediction
$\mu_e/\mu_+' = -6.582275856(27) \times 10^2$ CODATA 2022, $\sigma = -0.53$
$\mu_e/\mu_+' = -6.582275971(72) \times 10^2$ CODATA 2018, $\sigma = -1.40$
$\Delta_{\text{precision}} = +0.42$
$\Delta_{\text{scaled}} = -1.60$

muon-proton magnetic moment ratio 1036.95(23)

$$\frac{\mu_\mu}{\mu_+} = -\frac{S}{P_{up}}\left(\frac{m_+}{m_\mu}\right)\left(1 + \frac{\sqrt{35}}{2\pi}\left(\frac{4K}{18}\right) ж_2{}^2\, ж_3{}^2\, ж_4{}^2 \boxtimes\right)$$

Where S = Sierpiński's constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_μ = the muon mass, π = Archimedes' constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_\mu/\mu_+ = -3.18334511221316\ldots$ prediction
$\mu_\mu/\mu_+ = -3.183345146(71)$ CODATA 2022, $\sigma = +0.48$
$\mu_\mu/\mu_+ = -3.183345142(71)$ CODATA 2018, $\sigma = -0.42$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.06$

shielded proton magnetic moment to nuclear magneton ratio

-581.173(40)

$$\frac{\mu_+'}{\mu_N} = \frac{2\,ж_1\,ж_2{}^2}{S}\left(1 - \frac{1}{e^{6\gamma}}\left(\frac{2\pi}{2K}\right) ж_2{}^2\,ж_3{}^2\,ж_4{}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, e = Euler's number, γ = the Euler-Mascheroni constant, π = Archimedes' constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_+'/\mu_N = 2.79277562234849\ldots$ prediction
$\mu_+'/\mu_N = 2.792775648(11)$ CODATA 2022, $\sigma = -2.33$
$\mu_+'/\mu_N = 2.792775599(30)$ CODATA 2018, $\sigma = +0.78$
$\Delta_{\text{precision}} = +0.44$
$\Delta_{\text{scaled}} = +1.63$

shielded proton magnetic moment to Bohr magneton ratio

-581.174(41)

$$\frac{\mu_+'}{\mu_B} = \frac{2\,ж_1\,ж_2{}^2}{S}\left(\frac{m_e}{m_+}\right)\left(1 - \frac{1}{e^{6\gamma}}\left(\frac{2\pi}{2K}\right) ж_2{}^2\,ж_3{}^2\,ж_4{}^2 \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, m_e = the electron mass, m_+ = the proton mass, e = Euler's number, γ = the Euler-Mascheroni constant, π = Archimedes' constant, K = Catalan's constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_+'/\mu_B = 1.52099314114035\ldots \times 10^{-3}$ prediction
$\mu_+'/\mu_B = 1.5209931551(62) \times 10^{-3}$ CODATA 2022, $\sigma = -2.25$
$\mu_+'/\mu_B = 1.520993128(17) \times 10^{-3}$ CODATA 2018, $\sigma = +0.78$
$\Delta_{\text{precision}} = +1.44$
$\Delta_{\text{scaled}} = +1.59$

proton gyromagnetic ratio -324.098045(83)

$$\gamma_+ = \frac{2\,ж_1{}^2\,ж_2{}^2}{S}\left(\frac{q_p}{m_+}\right)\left(1 - \frac{1}{\mathbf{5}}\left(\frac{2\pi}{4s}\right)ж_2{}^2\,ж_3{}^2\,ж_4{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, q_p = the Planck charge, m_+ = the proton mass, π = Archimedes' constant, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\gamma_+ = 2.67522187170411\ldots \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ prediction
$\gamma_+ = 2.6752218708(11) \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ CODATA 2018, $\sigma = +0.82$
$\gamma_+ = 2.6752218744(11) \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ CODATA 2018, $\sigma = -2.45$
$\Delta_{\mathrm{precision}} = -0.02$
$\Delta_{\mathrm{scaled}} = +3.27$

proton gyromagnetic ratio in MHz/T -324.097998(83)

$$\dot{\gamma}_+ = \frac{ж_1{}^2\,ж_2{}^2}{\pi\,S}\,\frac{1}{\mathrm{MHz}}\left(\frac{\mathrm{s}\,q_p}{m_+}\right)\left(1 - \frac{1}{\mathbf{5}}\left(\frac{2\pi}{4s}\right)ж_2{}^2\,ж_3{}^2\,ж_4{}^2\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, π = Archimedes' constant, S = Sierpiński's constant, MHz = the megahertz, s = the second, q_p = the Planck charge, m_+ = the proton mass, π = Archimedes' constant, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\gamma}_+ = 4.25774784749262\ldots \times 10^1\ \mathrm{MHz/T}$ prediction
$\dot{\gamma}_+ = 4.2577478461(18) \times 10^1\ \mathrm{MHz/T}$ CODATA 2022, $\sigma = +0.77$
$\dot{\gamma}_+ = 4.2577478518(18) \times 10^1\ \mathrm{MHz/T}$ CODATA 2018, $\sigma = -2.39$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -3.17$

proton magnetic moment -318.9479(42)

$$\mu_{+} = \frac{ж_1{}^2\, ж_2{}^2}{S}\left(\frac{l_p{}^2 q_p\, m_p}{t_p\, m_{+}}\right)\left(1 - \frac{\mathbf{7}}{\mathbf{5}}\left(\frac{Im(\omega_1)}{6s}\right) ж_2{}^2\, ж_3{}^2\, ж_4{}^2\, ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, S = Sierpiński's constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_{+} = the proton mass, ω_1 = the omega_1 constant, s = the arc length of the unit lemniscate, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{+} = 1.41060679716311 \ldots \times 10^{-26}$ J/T prediction
$\mu_{+} = 1.41060679545(60) \times 10^{-26}$ J/T CODATA 2018, $\sigma = +2.86$
$\mu_{+} = 1.41060679736(60) \times 10^{-26}$ J/T CODATA 2018, $\sigma = -0.32$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -3.18$

Faraday constant -283.17057(51)

$$F = \frac{6}{e^{\gamma}}\,ж_1{}^3\left(\frac{1}{m_p}\right)\left(1-\left(\frac{2K}{35}\right)ж_2{}^2\,ж_3{}^2\,ж_4{}^2\,⊠\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, m_p = the Planck mass, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$F = 9.6485332\,2042857\ldots \times 10^4$ C/mol prediction
$F = 9.648533212 \times 10^4$ C/mol CODATA 2022, 9.06-digit match
$F = 9.648533212 \times 10^4$ C/mol CODATA 2018, 9.06-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

molar Planck constant -278.3994(13)

$$M_p = \frac{6}{e^{\gamma}}\,ж_1{}^2\,2\pi\left(\frac{l_p{}^2}{s^2\,t_p\,q_p}\right)\left(1-\frac{5}{\sqrt{32}}\left(\frac{2K}{6s}\right)ж_2{}^2\,ж_3{}^2\,ж_4{}^2\,⊠\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, s = the second, t_p = the Planck time, q_p = the Planck charge, K = Catalan's constant, s = the arc length of the unit lemniscate, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$M_p = 3.99031271\,062295\ldots \times 10^{-10}$ J/Hz mol prediction
$M_p = 3.990312712 \times 10^{-10}$ J/Hz mol CODATA 2022, 9.46-digit match
$M_p = 3.990312712 \times 10^{-10}$ J/Hz mol CODATA 2018, 9.46-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

molar volume of silicon 3747.90(50)

$$V_m(Si) = \frac{6}{e^{\gamma}} \left(\frac{2\pi}{32\, s} \right)^3 \frac{1}{ж_1{}^{10}} \left(\frac{l_p{}^3\, m_p{}^2}{q_p\, m_e{}^3} \right) \left(1 + \frac{32}{18^2} \left(\frac{4\pi}{D_d} \right) ж_2{}^2\, ж_3{}^2\, ж_4{}^2\, \boxtimes \right)$$

Where $e =$ Euler's number, $\gamma =$ the Euler-Mascheroni constant, $\pi =$ Archimedes' constant, $s =$ the arc length of the unit lemniscate, $ж_1 =$ the 1st hyperbolic partition constant, $l_P =$ the Planck length, $m_p =$ the Planck mass, $q_p =$ the Planck charge, $m_e =$ the electron mass, $D_d =$ the dimer constant, $ж_2 =$ the 2nd hyperbolic partition constant, $ж_3 =$ the 3rd hyperbolic partition constant, $ж_4 =$ the 4th hyperbolic partition constant, and $\boxtimes =$ the hyperbolic inversion boundary.

$V_m(Si) = 1.20588317215772\ldots \times 10^{-5}\ \mathrm{m^3/mol}$ prediction
$V_m(Si) = 1.205883199(60) \times 10^{-5}\ \mathrm{m^3/mol}$ CODATA 2018, $\sigma = -0.45$
$V_m(Si) = 1.205883199(60) \times 10^{-5}\ \mathrm{m^3/mol}$ CODATA 2018, $\sigma = -0.45$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

speed of light in vacuum

$$c = \left(\frac{l_p}{t_p} \right) \left(1 + \sqrt{G_{\text{Gi}}} \, (\text{ж}_1 - \text{ж}_2) \boxtimes \right)$$

Where l_p = the Planck length, t_p = the Planck time, G_{Gi} = Gieseking's constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$c = 2.99792458097898 \ldots \times 10^8 \text{ m/s}$	prediction
$c = 2.99792458 \times 10^8 \text{ m/s}$	CODATA 2022, 9-digit match
$c = 2.99792458 \times 10^8 \text{ m/s}$	CODATA 2018, 9-digit match
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +0.00$

Also listed as the *natural unit of velocity*.

inverse meter-hertz relationship -3.595(16)

$$\frac{1}{\text{m}} : \text{Hz} = \left(\frac{l_p}{t_p \ \text{m}} \right) \left(1 + \sqrt{G_{\text{Gi}}} \, (\text{ж}_1 - \text{ж}_2) \boxtimes \right)$$

Where l_p = the Planck length, t_p = the Planck time, m = the meter, G_{Gi} = Gieseking's constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$1/\text{m} : \text{Hz} = 2.99792458097898 \ldots \times 10^8 \text{ Hz}$	prediction
$1/\text{m} : \text{Hz} = 2.99792458 \times 10^8 \text{ Hz}$	CODATA 2022, 9-digit match
$1/\text{m} : \text{Hz} = 2.99792458 \times 10^8 \text{ Hz}$	CODATA 2018, 9-digit match
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +0.00$

classical electron radius 8.7468(46)

$$r_e = ж_1{}^2 \left(\frac{l_p\, m_p}{m_e} \right) \left(1 - \sqrt{6\, C_{\mathrm{R1}}}\, (\, ж_1 - ж_2\,) ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, C_{R1} = Ramanujan's 1st continued fraction constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$r_e = 2.81794032699479 \ldots \times 10^{-15}$ m	prediction
$r_e = 2.8179403205(13) \times 10^{-15}$ m	CODATA 2022, $\sigma = +5.00$
$r_e = 2.8179403262(13) \times 10^{-15}$ m	CODATA 2018, $\sigma = +0.61$
	$\Delta_{\mathrm{precision}} = +0.00$
	$\Delta_{\mathrm{scaled}} = -4.38$

atomic unit of length 8.7701(15)

$$a_0 = \frac{1}{ж_1{}^2} \left(\frac{l_p\, m_p}{m_e} \right) \left(1 - \sqrt{6\, C_{\mathrm{R1}}}\, (\, ж_1 - ж_2\,) ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, C_{R1} = Ramanujan's 1st continued fraction constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$a_0 = 5.29177210521101 \ldots \times 10^{-11}$ m	prediction
$a_0 = 5.29177210544(82) \times 10^{-11}$ m	CODATA 2022, $\sigma = -0.28$
$a_0 = 5.29177210903(80) \times 10^{-11}$ m	CODATA 2018, $\sigma = -4.77$
	$\Delta_{\mathrm{precision}} = -0.03$
	$\Delta_{\mathrm{scaled}} = -4.48$

Also listed as the *Bohr radius*.

Thomson cross section 17.5080(90)

$$\sigma_e = \sqrt{\frac{32}{18}}\; 2\pi\, ж_1{}^4 \left(\frac{l_p\, m_p}{m_e}\right)^2 \left(1 - 2\sqrt{6\, C_{\mathrm{R1}}}\,(ж_1 - ж_2)\, ⊠\right)$$

Where π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, C_{R1} = Ramanujan's 1st continued fraction constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\sigma_e = 6.6524587358977 1 \ldots \times 10^{-29}\ \mathrm{m}^2$ prediction
$\sigma_e = 6.6524587051(62) \times 10^{-29}\ \mathrm{m}^2$ CODATA 2022, $\sigma = +4.97$
$\sigma_e = 6.6524587321(60) \times 10^{-29}\ \mathrm{m}^2$ CODATA 2018, $\sigma = +0.63$
$\Delta_{\mathrm{precision}} = -0.03$
$\Delta_{\mathrm{scaled}} = -4.50$

Fermi coupling constant −243.6(51)

$$\frac{G_{\mathrm{F}}}{(\hbar c)^3} = \sqrt{\frac{32}{18}} \left(2\pi\, \frac{\mathrm{joule}}{\mathrm{GeV}}\right)^2 \left(\frac{t_p{}^4}{l_p{}^4\, m_p\, \mathrm{kg}}\right)\left(1 + 28\sqrt{6\, C_{\mathrm{R1}}}\,(ж_1 - ж_2)\, ⊠\right)$$

Where π = Archimedes' constant, GeV = the gigaelectron volt, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, kg = the kilogram, C_{R1} = Ramanujan's 1st continued fraction constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$G_{\mathrm{F}}/(\hbar c)^3 = 1.16637852183353 \ldots \times 10^{-5}\ \mathrm{GeV}^{-2}$ prediction
$G_{\mathrm{F}}/(\hbar c)^3 = 1.1663787(06) \times 10^{-5}\ \mathrm{GeV}^{-2}$ CODATA 2022, $\sigma = -0.30$
$G_{\mathrm{F}}/(\hbar c)^3 = 1.1663787(06) \times 10^{-5}\ \mathrm{GeV}^{-2}$ CODATA 2018, $\sigma = -0.30$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

atomic mass constant -1.3664(31)

$$\mathrm{A_{mass}} = \sqrt{\frac{18}{32}\frac{P_{up}}{ж_1{}^6}}\,(\,m_e\,)\left(1+\frac{1}{L}(\,ж_1 - ж_2\,)\,⊠\right)$$

Where P_{up} = the universal parabolic constant, $ж_1$ = the 1st hyperbolic partition constant, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{A_{mass}} = 1.66053906821322\ldots \times 10^{-27}$ kg prediction
$\mathrm{A_{mass}} = 1.66053906892(52) \times 10^{-27}$ kg CODATA 2022, $\sigma = -1.36$
$\mathrm{A_{mass}} = 1.66053906660(50) \times 10^{-27}$ kg CODATA 2018, $\sigma = +3.23$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +4.64$

Also listed as the *atomic mass unit-kilogram relationship*, and the *unified atomic mass unit*.

kilogram-atomic mass unit relationship 1.3665(30)

$$\mathrm{kg} \mathrel{⁝} \mathrm{A_{mass}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{\mathrm{kg}}{m_e}\right)\left(1-\frac{1}{L}(\,ж_1 - ж_2\,)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, kg = the kilogram, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{Kg} \mathrel{⁝} \mathrm{A_{mass}} = 6.02214075623046\ldots \times 10^{26}$ u prediction
$\mathrm{kg} \mathrel{⁝} \mathrm{A_{mass}} = 6.0221407537(19) \times 10^{26}$ u CODATA 2022, $\sigma = +1.33$
$\mathrm{kg} \mathrel{⁝} \mathrm{A_{mass}} = 6.0221407621(18) \times 10^{26}$ u CODATA 2018, $\sigma = -3.26$
$\Delta_{\mathrm{precision}} = -0.03$
$\Delta_{\mathrm{scaled}} = -4.66$

electron relative atomic mass 1.36644(29)

$$A_r(e) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(e) = 5.48579909049541 \ldots \times 10^{-4}$ prediction
$A_r(e) = 5.485799090441(97) \times 10^{-4}$ CODATA 2022, $\sigma = +0.56$
$A_r(e) = 5.48579909065(16) \times 10^{-4}$ CODATA 2018, $\sigma = -0.97$
$\Delta_{precision} = -0.78$
$\Delta_{scaled} = 1.31$

proton relative atomic mass 1.36639(53)

$$A_r(+) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(\frac{m_+}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(+) = 1.00727646658226 \ldots$ prediction
$A_r(+) = 1.0072764665789(83)$ CODATA 2022, $\sigma = +0.41$
$A_r(+) = 1.007276466621(53)$ CODATA 2018, $\sigma = -0.73$
$\Delta_{precision} = -0.20$
$\Delta_{scaled} = -0.81$

neutron relative atomic mass 1.3653(48)

$$A_r(n) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(\frac{m_n}{m_e}\right)\left(1-\frac{1}{L}(ж_1-ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_n = the neutron mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(n) = 1.00866491547289\ldots$ prediction
$A_r(n) = 1.00866491606(40)$ CODATA 2022, $\sigma = -1.47$
$A_r(n) = 1.00866491595(49)$ CODATA 2018, $\sigma = -0.97$
$\Delta_{\text{precision}} = +0.09$
$\Delta_{\text{scaled}} = +0.22$

deuteron relative atomic mass 1.36674(20)

$$A_r(\text{de}) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(\frac{m_{\text{de}}}{m_e}\right)\left(1-\frac{1}{L}(ж_1-ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{de} = the deuteron mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(\text{de}) = 2.01355321254847\ldots$ prediction
$A_r(\text{de}) = 2.013553212544(15)$ CODATA 2022, $\sigma = +0.32$
$A_r(\text{de}) = 2.013553212745(40)$ CODATA 2018, $\sigma = -4.91$
$\Delta_{\text{precision}} = +0.43$
$\Delta_{\text{scaled}} = -5.03$

helion relative atomic mass 1.36637(32)

$$A_r(\text{he}) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(\frac{m_{\text{he}}}{m_e}\right)\left(1-\frac{1}{L}(ж_1 - ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{he} = the helion mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(\text{he}) = 3.01493224693074\ldots$ prediction
$A_r(\text{he}) = 3.014932246932(74)$ CODATA 2022, $\sigma = -0.02$
$A_r(\text{he}) = 3.014932247175(97)$ CODATA 2018, $\sigma = -2.52$
$\Delta_{\text{precision}} = +0.12$
$\Delta_{\text{scaled}} = -2.51$

triton relative atomic mass 1.36615(40)

$$A_r(\text{tri}) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}\left(\frac{m_{\text{tri}}}{m_e}\right)\left(1-\frac{1}{L}(ж_1 - ж_2)\boxtimes\right)}$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{tri} = the triton mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_r(\text{tri}) = 3.0155007157216\ldots$ prediction
$A_r(\text{tri}) = 3.01550071597(10)$ CODATA 2022, $\sigma = -2.48$
$A_r(\text{tri}) = 3.01550071621(12)$ CODATA 2018, $\sigma = -4.07$
$\Delta_{\text{precision}} = +0.08$
$\Delta_{\text{scaled}} = -2.00$

alpha particle relative atomic mass 1.36577(15)

$$\mathrm{A_r}(\alpha) = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_\alpha}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_α = the alpha particle mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{A_r}(\alpha) = 4.00150617912918\ldots$ prediction
$\mathrm{A_r}(\alpha) = 4.001506179129(62)$ CODATA 2022, $\sigma = +0.00$
$\mathrm{A_r}(\alpha) = 4.001506179127(63)$ CODATA 2018, $\sigma = +0.03$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.03$

electron mass in u 1.36644(29)

$$\frac{m_e}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $\mathrm{A_{mass}}$ = atomic mass constant, $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_e/\mathrm{A_{mass}} = 5.485799090495 41\ldots \times 10^{-4}$ u prediction
$m_e/\mathrm{A_{mass}} = 5.485799090441(97) \times 10^{-4}$ u CODATA 2022, $\sigma = +0.56$
$m_e/\mathrm{A_{mass}} = 5.48579909065(16) \times 10^{-4}$ u CODATA 2018, $\sigma = -0.96$
$\Delta_{\text{precision}} = +0.22$
$\Delta_{\text{scaled}} = -1.25$

neutron-proton mass difference in u 0.63(3.52)

$$\frac{m_\Delta}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{\text{ж}_1{}^6}{P_{up}}}\left(\frac{m_n - m_+}{m_e}\right)\left(1 - \frac{1}{L}(\text{ж}_1 - \text{ж}_2)\boxtimes\right)$$

Where ж_1 = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_n = the neutron mass, m_+ = the proton mass, m_e = the electron mass, L = the lemniscate constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\Delta/\mathrm{A_{mass}} = 1.38844889062885 \ldots \times 10^{-3}$ u prediction
$m_\Delta/\mathrm{A_{mass}} = 1.38844948(40) \times 10^{-3}$ u CODATA 2022, $\sigma = -1.40$
$m_\Delta/\mathrm{A_{mass}} = 1.38844933(49) \times 10^{-3}$ u CODATA 2018, $\sigma = -0.90$
$\Delta_{\mathrm{precision}} = +0.09$
$\Delta_{\mathrm{scaled}} = +0.31$

muon mass in u 1.40(22)

$$\frac{m_\mu}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{\text{ж}_1{}^6}{P_{up}}}\left(\frac{m_\mu}{m_e}\right)\left(1 - \frac{1}{L}(\text{ж}_1 - \text{ж}_2)\boxtimes\right)$$

Where ж_1 = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_μ = the muon mass, m_e = the electron mass, L = the lemniscate constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\mu/\mathrm{A_{mass}} = 1.13428925044824 \ldots \times 10^{-1}$ u prediction
$m_\mu/\mathrm{A_{mass}} = 1.134289257(25) \times 10^{-1}$ u CODATA 2022, $\sigma = -0.26$
$m_\mu/\mathrm{A_{mass}} = 1.134289259(25) \times 10^{-1}$ u CODATA 2018, $\sigma = -0.34$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -0.08$

proton mass in u 1.36639(53)

$$\frac{m_+}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_+}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_+ = the proton mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_+/\mathrm{A_{mass}} = 1.00727646658226\ldots$ u prediction
$m_+/\mathrm{A_{mass}} = 1.0072764665789(83)$ u CODATA 2022, $\sigma = +0.41$
$m_+/\mathrm{A_{mass}} = 1.007276466621(53)$ u CODATA 2018, $\sigma = -0.73$
$\Delta_{\mathrm{precision}} = +0.81$
$\Delta_{\mathrm{scaled}} = -2.06$

neutron mass in u 1.3653(48)

$$\frac{m_n}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_n}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_n = the neutron mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_n/\mathrm{A_{mass}} = 1.00866491547289\ldots$ u prediction
$m_n/\mathrm{A_{mass}} = 1.00866491606(40)$ u CODATA 2022, $\sigma = -1.47$
$m_n/\mathrm{A_{mass}} = 1.00866491595(49)$ u CODATA 2018, $\sigma = -0.97$
$\Delta_{\mathrm{precision}} = +0.09$
$\Delta_{\mathrm{scaled}} = +0.22$

tau mass in u -3.0(678)

$$\frac{m_\tau}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_\tau}{m_e}\right)\left(1-\frac{1}{L}(ж_1-ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_τ = the tau mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_\tau/\mathrm{A_{mass}} = 1.90754046521642\ldots$ u prediction
$m_\tau/\mathrm{A_{mass}} = 1.90754(13)$ u CODATA 2022, $\sigma = +0.00$
$m_\tau/\mathrm{A_{mass}} = 1.90754(13)$ u CODATA 2018, $\sigma = +0.00$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

deuteron mass in u 1.36674(20)

$$\frac{m_{\mathrm{de}}}{\mathrm{A_{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_{\mathrm{de}}}{m_e}\right)\left(1-\frac{1}{L}(ж_1-ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{de} = the deuteron mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_{\mathrm{de}}/\mathrm{A_{mass}} = 2.01355321254878\ldots$ u prediction
$m_{\mathrm{de}}/\mathrm{A_{mass}} = 2.013553212544(15)$ u CODATA 2022, $\sigma = +0.32$
$m_{\mathrm{de}}/\mathrm{A_{mass}} = 2.013553212745(40)$ u CODATA 2018, $\sigma = -4.91$
$\Delta_{\mathrm{precision}} = +0.43$
$\Delta_{\mathrm{scaled}} = -5.03$

helion mass in u 1.36637(32)

$$\frac{m_{\text{he}}}{\text{A}_{\text{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_{\text{he}}}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{he} = the helion mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_{\text{he}}/\text{A}_{\text{mass}} = 3.01493224693074\ldots$ u prediction
$m_{\text{he}}/\text{A}_{\text{mass}} = 3.014932246932(74)$ u CODATA 2022, $\sigma = -0.02$
$m_{\text{he}}/\text{A}_{\text{mass}} = 3.014932247175(97)$ u CODATA 2018, $\sigma = -2.52$
$\Delta_{\text{precision}} = +0.12$
$\Delta_{\text{scaled}} = -2.51$

triton mass in u 1.36715(40)

$$\frac{m_{\text{tri}}}{\text{A}_{\text{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_{\text{tri}}}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{tri} = the triton mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$m_{\text{tri}}/\text{A}_{\text{mass}} = 3.01550071572160\ldots$ u prediction
$m_{\text{tri}}/\text{A}_{\text{mass}} = 3.01550071597(10)$ u CODATA 2022, $\sigma = -2.48$
$m_{\text{tri}}/\text{A}_{\text{mass}} = 3.01550071621(12)$ u CODATA 2018, $\sigma = -4.15$
$\Delta_{\text{precision}} = +0.08$
$\Delta_{\text{scaled}} = -2.00$

alpha particle mass in u 1.36577(15)

$$\frac{m_\alpha}{\text{A}_{\text{mass}}} = \sqrt{\frac{32}{18}\frac{ж_1{}^6}{P_{up}}}\left(\frac{m_\alpha}{m_e}\right)\left(1 - \frac{1}{L}(ж_1 - ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, m_α = the alpha particle mass, m_e = the electron mass, L = the lemniscate constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\alpha/\text{A}_{\text{mass}} = 4.00150617912918\ldots$ u	prediction
$m_\alpha/\text{A}_{\text{mass}} = 4.001506179129(62)$ u	CODATA 2022, $\sigma = +0.00$
$m_\alpha/\text{A}_{\text{mass}} = 4.001506179127(63)$ u	CODATA 2018, $\sigma = +0.03$
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +0.03$

electron volt-atomic mass unit relationship 8.9646(30)

$$eV : A_{mass} = joule^2 \sqrt{\frac{32}{18}\frac{ж_1{}^8}{P_{up}}}\left(\frac{t_p{}^2\, q_p}{l_p{}^2\, C\, m_e}\right)\left(1 - \alpha_F\,(ж_1 - ж_2)\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, C = the coulomb, m_e = the electron mass, α_F = the alpha Feigenbaum constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$eV : A_{mass} = 1.07354410142667 \ldots \times 10^{-9}$ u prediction
$eV : A_{mass} = 1.07354410083(33) \times 10^{-9}$ u CODATA 2022, $\sigma = +1.75$
$eV : A_{mass} = 1.07354410233(32) \times 10^{-9}$ u CODATA 2018, $\sigma = -2.82$
$\Delta_{precision} = -0.03$
$\Delta_{scaled} = -4.68$

atomic mass unit-electron volt relationship -8.9646(30)

$$A_{mass} : eV = \sqrt{\frac{18}{32}\frac{P_{up}}{ж_1{}^8}}\left(\frac{l_p{}^2\, C\, m_e}{t_p{}^2\, q_p}\right)\left(1 + \alpha_F\,(ж_1 - ж_2)\,\boxtimes\right)$$

Where P_{up} = the universal parabolic constant, $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, C = the coulomb, m_e = the electron mass, t_p = the Planck time, q_p = the Planck charge, α_F = the alpha Feigenbaum constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{mass} : eV = 9.31494103195445 \ldots \times 10^{8}$ eV prediction
$A_{mass} : eV = 9.3149410372(29) \times 10^{8}$ eV CODATA 2022, $\sigma = -1.81$
$A_{mass} : eV = 9.3149410242(28) \times 10^{8}$ eV CODATA 2018, $\sigma = +2.77$
$\Delta_{precision} = -0.04$
$\Delta_{scaled} = +4.64$

joule-inverse meter relationship -1.5349(10)

$$\mathrm{J} ⫶ \frac{1}{\mathrm{m}} = \frac{\text{joule}}{2\pi}\left(\frac{{t_p}^2}{{l_p}^3\, m_p}\right)\left(1 + \frac{2}{\delta_F}(\,ж_1 - ж_2\,)\boxtimes\right)$$

Where π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, δ_F = the delta Feigenbaum constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

J ⫶ 1/m = 5.03411656778384 ... × 10^{24} cycles/m prediction
J ⫶ 1/m = 5.034116567 × 10^{24} cycles/m CODATA 2022, 10-digit match
J ⫶ 1/m = 5.034116567 × 10^{24} cycles/m CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

electron volt-inverse meter relationship -1.53673(62)

$$\mathrm{eV} ⫶ \frac{1}{\mathrm{m}} = \frac{\mathrm{eV}}{2\pi}\left(\frac{{t_p}^2}{{l_p}^3\, m_p}\right)\left(1 + \frac{2}{\delta_F}(\,ж_1 - ж_2\,)\boxtimes\right)$$

Where eV = the electron-volt, π = Archimedes' constant, t_p = the Planck time, l_p = the Planck length, m_p = the Planck mass, δ_F = the delta Feigenbaum constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

eV ⫶ 1/m = 8.06554393884387 ... × 10^5 cycles/m prediction
eV ⫶ 1/m = 8.065543937 × 10^5 cycles/m CODATA 2022, 9.64-digit match
eV ⫶ 1/m = 8.065543937 × 10^5 cycles/m CODATA 2018, 9.64-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

inverse meter-electron volt relationship 1.5376(41)

$$\frac{1}{\mathrm{m}} \vdots \mathrm{eV} = 2\pi \frac{\mathrm{joule}}{\mathrm{eV}} \left(\frac{{l_p}^3\, m_p}{{t_p}^2\, \mathrm{m}} \right) \left(1 - \frac{2}{\delta_F} (\text{ж}_1 - \text{ж}_2) \boxtimes \right)$$

Where π = Archimedes' constant, eV = the electron-volt, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, m = the meter, δ_F = the delta Feigenbaum constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$1/\mathrm{m} \vdots \mathrm{eV} = 1.23984198410221 \ldots \times 10^{-6}$ eV prediction
$1/\mathrm{m} \vdots \mathrm{eV} = 1.239841984 \times 10^{-6}$ eV CODATA 2022, 10-digit match
$1/\mathrm{m} \vdots \mathrm{eV} = 1.239841984 \times 10^{-6}$ eV CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

inverse meter-joule relationship 1.5349(10)

$$\frac{1}{\mathrm{m}} \vdots \mathrm{J} = 2\pi \left(\frac{{l_p}^3\, m_p}{{t_p}^2\, \mathrm{m}} \right) \left(1 - \frac{2}{\delta_F} (\text{ж}_1 - \text{ж}_2) \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, m = the meter, δ_F = the delta Feigenbaum constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$1/\mathrm{m} \vdots \mathrm{J} = 1.98644585705373 \ldots \times 10^{-25}$ J prediction
$1/\mathrm{m} \vdots \mathrm{J} = 1.986445857 \times 10^{-25}$ J CODATA 2022, 10-digit match
$1/\mathrm{m} \vdots \mathrm{J} = 1.986445857 \times 10^{-25}$ J CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

reduced Planck constant times c in MeV fm 1.5345(13)

$$\dot{\hbar} c = \frac{\text{joule}}{\text{MeV fm}} \left(\frac{{l_p}^3 \text{ m } m_p}{{t_p}^2} \right) \left(1 - \frac{2}{\delta_F} (ж_1 - ж_2) ⊠ \right)$$

Where MeV = the megaelectron-volt, fm = the femtometer, l_p = the Planck length, m = the meter, m_p = the Planck mass, t_p = the Planck time, δ_F = the delta Feigenbaum constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\hbar} c = 1.973269804\,22731 \ldots \times 10^2$ MeV fm prediction
$\dot{\hbar} c = 1.973269804 \times 10^2$ MeV fm CODATA 2022, 10-digit match
$\dot{\hbar} c = 1.973269804 \times 10^2$ MeV fm CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

atomic unit of electric potential $-6.251583(11)$

$$A_{\text{e pot}} = \sqrt{\frac{32}{18}\frac{\text{ж}_1{}^{12}}{P_{up}}}\left(\frac{l_p{}^2\,A_{\text{mass}}}{t_p{}^2\,q_p}\right)\left(1-\frac{35}{18}\left(\frac{4}{\delta_F}\right)(\text{ж}_1+\text{ж}_2)\boxtimes\right)$$

Where ж_1 = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, l_p = the Planck length, A_{mass} = the atomic mass constant, t_p = the Planck time, q_p = the Planck charge, δ_F = the delta Feigenbaum constant, ж_2 = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{\text{e pot}} = 2.72113862459609\ldots \times 10^1$ V prediction
$A_{\text{e pot}} = 2.7211386245981(30) \times 10^1$ V CODATA 2022, $\sigma = -0.67$
$A_{\text{e pot}} = 2.7211386245988(53) \times 10^1$ V CODATA 2018, $\sigma = -0.51$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.13$

Rydberg constant times hc in eV $-6.251583(11)$

$$\dot{R}_\infty hc = \frac{1}{2}\sqrt{\frac{32}{18}\frac{\text{ж}_1{}^{12}}{P_{up}}}\left(\frac{l_p{}^2\,C\,A_{\text{mass}}}{t_p{}^2\,q_p}\right)\left(1-\frac{35}{18}\left(\frac{4}{\delta_F}\right)(\text{ж}_1+\text{ж}_2)\boxtimes\right)$$

Where ж_1 = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, l_p = the Planck length, C = the coulomb, A_{mass} = the atomic mass constant, t_p = the Planck time, q_p = the Planck charge, δ_F = the delta Feigenbaum constant, ж_2 = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{R}_\infty hc = 1.36056931229804\ldots \times 10^1$ eV prediction
$\dot{R}_\infty hc = 1.3605693122990(15) \times 10^1$ eV CODATA 2022, $\sigma = -0.64$
$\dot{R}_\infty hc = 1.3605693122994(26) \times 10^1$ eV CODATA 2018, $\sigma = -0.52$
$\Delta_{\text{precision}} = +0.24$
$\Delta_{\text{scaled}} = -0.15$

hartree-electron volt relationship $-6.251583(11)$

$$E_h : \text{eV} = \sqrt{\frac{32}{18}\,\frac{ж_1{}^{12}}{P_{up}}}\left(\frac{l_p{}^2\,\text{C}\,\text{A}_{\text{mass}}}{t_p{}^2\,q_p}\right)\left(1-\frac{35}{18}\left(\frac{4}{\delta_F}\right)(ж_1+ж_2)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, l_p = the Planck length, C = the coulomb, A_{mass} = the atomic mass constant, t_p = the Planck time, q_p = the Planck charge, δ_F = the delta Feigenbaum constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$E_h : \text{eV} = 2.72113862459609 \ldots \times 10^1\ \text{eV}$ prediction
$E_h : \text{eV} = 2.7211386245981(30) \times 10^1\ \text{eV}$ CODATA 2022, $\sigma = -0.67$
$E_h : \text{eV} = 2.7211386245988(53) \times 10^1\ \text{eV}$ CODATA 2018, $\sigma = -0.51$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.13$

Also listed as the *Hartree energy in eV*.

electron volt-hartree relationship $6.251583(11)$

$$\text{eV} : E_h = \sqrt{\frac{18}{32}\,\frac{P_{up}}{ж_1{}^{12}}}\left(\frac{t_p{}^2\,q_p}{l_p{}^2\,\text{C}\,\text{A}_{\text{mass}}}\right)\left(1+\frac{35}{18}\left(\frac{4}{\delta_F}\right)(ж_1+ж_2)\boxtimes\right)$$

Where P_{up} = the universal parabolic constant, $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, C = the coulomb, A_{mass} = the atomic mass constant, δ_F = the delta Feigenbaum constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{eV} : E_h = 3.67493221756773 \ldots \times 10^{-2}\ E_h$ prediction
$\text{eV} : E_h = 3.6749322175665(40) \times 10^{-2}\ E_h$ CODATA 2022, $\sigma = +0.31$
$\text{eV} : E_h = 3.6749322175655(71) \times 10^{-2}\ E_h$ CODATA 2018, $\sigma = +0.31$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = +0.14$

conventional value of farad-90 $-0.177949(50)$

$$F_{90} = \text{farad}\left(1 + \frac{C_d}{6}(\text{ж}_1 + \text{ж}_3 + \text{ж}_4)\boxtimes \right)$$

Where C_d = the domino tiling constant, ж_1 = the 1st hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$F_{90} = 0.999999982178026 \ldots$ F prediction
$F_{90} = 0.99999998220$ F CODATA 2022, 9.66-digit match
$F_{90} = 0.99999998220$ F CODATA 2018, 9.66-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

conventional value of henry-90 $0.177949(50)$

$$H_{90} = \text{henry}\left(1 - \frac{C_d}{6}(\text{ж}_1 + \text{ж}_3 + \text{ж}_4)\boxtimes \right)$$

Where C_d = the domino tiling constant, ж_1 = the 1st hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$H_{90} = 1.00000001782197 \ldots$ H prediction
$H_{90} = 1.00000001779$ H CODATA 2022, 10.50-digit match
$H_{90} = 1.00000001779$ H CODATA 2018, 10.50-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

conventional value of ohm-90 0.177949(50)

$$\Omega_{90} = \text{ohm}\left(1 - \frac{C_d}{6} (ж_1 + ж_3 + ж_4) \boxtimes \right)$$

Where C_d = the domino tiling constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\Omega_{90} = 1.0000000182197 \ldots \Omega$ prediction
$\Omega_{90} = 1.00000001779 \, \Omega$ CODATA 2022, 10.50-digit match
$\Omega_{90} = 1.00000001779 \, \Omega$ CODATA 2018, 10.50-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

neutron-proton mass difference −7.3(29)

$$m_\Delta = (m_n - m_+)\left(1 - 35 \, \frac{C_d}{6} (ж_1 + ж_3 + ж_4) \boxtimes \right)$$

Where m_n = the neutron mass, m_+ = the proton mass, C_d = the domino tiling constant, $ж_1$ = the 1st hyperbolic partition constants, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$m_\Delta = 2.30557506525214 \ldots \times 10^{-30}$ kg prediction
$m_\Delta = 2.30557461(67) \times 10^{-30}$ kg CODATA 2022, $\sigma = +0.68$
$m_\Delta = 2.30557435(82) \times 10^{-30}$ kg CODATA 2018, $\sigma = -2.86$
$\Delta_{\text{precision}} = +0.09$
$\Delta_{\text{scaled}} = +0.32$

helion shielding shift $-599.67077(23)$

$$\sigma_{\text{he}} = 1 - \left(1 - \sqrt{\frac{7\, s^4}{\mathcal{P}^8\, (\, 2\pi\,)^3}}\, (\, ж_1 - ж_3 - ж_4\,)\, \boxtimes \right)$$

Where $\mathcal{P}$ = the prime constant, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\sigma_{\text{he}} = 5.99670299153336\ldots \times 10^{-5}$ prediction
$\sigma_{\text{he}} = 5.9967029(23) \times 10^{-5}$ CODATA 2022, $\sigma = +0.04$
$\sigma_{\text{he}} = 5.996743(10) \times 10^{-5}$ CODATA 2018, $\sigma = -4.00$
$\Delta_{\text{precision}} = +0.64$
$\Delta_{\text{scaled}} = -4.10$

shielding difference of t and p in HT $-0.239450(20)$

$$\sigma_{\text{tp}} = 1 - \left(1 - \frac{1}{7} \sqrt{\frac{s^4}{2^4\, (\, 2\pi\,)^3}}\, (\, ж_1 - ж_3 - ж_4\,)\, \boxtimes \right)$$

Where s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\sigma_{\text{tp}} = 2.39369251464032\ldots \times 10^{-8}$ prediction
$\sigma_{\text{tp}} = 2.39450(20) \times 10^{-8}$ CODATA 2022, $\sigma = -4.04$
$\sigma_{\text{tp}} = 2.4140(20) \times 10^{-8}$ CODATA 2018, $\sigma = -10.15$
$\Delta_{\text{precision}} = +1.00$
$\Delta_{\text{scaled}} = -9.75$

shielding difference of d and p in HD $-0.198770(10)$

$$\sigma_{\mathrm{dp}} = 1 - \left(1 - \frac{1}{3} \sqrt{\frac{5\, s^4}{2^4\,(\,2\pi\,)^5}}\,(\,ж_1 - ж_3 - ж_4\,)\,⊠ \right)$$

Where s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $⊠$ = the hyperbolic inversion boundary.

$\sigma_{\mathrm{dp}} = 1.98769745110889 \ldots \times 10^{-8}$ prediction
$\sigma_{\mathrm{dp}} = 1.98770(10) \times 10^{-8}$ CODATA 2022, $\sigma = -0.03$
$\sigma_{\mathrm{dp}} = 2.0200(20) \times 10^{-8}$ CODATA 2018, $\sigma = -16.15$
$\Delta_{\mathrm{precision}} = +1.30$
$\Delta_{\mathrm{scaled}} = -16.15$

proton magnetic shielding correction $-256.715(41)$

$$\sigma_+{}' = 1 - \left(1 - 35 \sqrt{\frac{s^8}{2^4\,(\,2\pi\,)^5}}\,(\,ж_1 - ж_3 - ж_4\,)\,⊠ \right)$$

Where s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $⊠$ = the hyperbolic inversion boundary.

$\sigma_+{}' = 2.56684124759787 \ldots \times 10^{-5}$ prediction
$\sigma_+{}' = 2.56715(41) \times 10^{-5}$ CODATA 2022, $\sigma = -0.75$
$\sigma_+{}' = 2.5689(11) \times 10^{-5}$ CODATA 2018, $\sigma = -1.87$
$\Delta_{\mathrm{precision}} = +0.43$
$\Delta_{\mathrm{scaled}} = -1.64$

atomic unit of electric polarizability 25.5252(31)

$$A_{ep} = \frac{1}{ж_1{}^6}\left(\frac{t_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 - 18\sqrt{\frac{s^9}{2^{11}\,(\,2\pi\,)^{5}}}\,(\,ж_1 + ж_3 + ж_4\,)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, m_e = the electron mass, L = the lemniscate constant, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{ep} = 1.64877727300424 \ldots \times 10^{-41}\ \mathrm{m^2 \cdot C^2 / J}$	prediction
$A_{ep} = 1.64877727212(51) \times 10^{-41}\ \mathrm{m^2 \cdot C^2 / J}$	CODATA 2018, $\sigma = +1.73$
$A_{ep} = 1.64877727436(50) \times 10^{-41}\ \mathrm{m^2 \cdot C^2 / J}$	CODATA 2018, $\sigma = -2.71$
	$\Delta_{\text{precision}} = -0.01$
	$\Delta_{\text{scaled}} = -4.48$

atomic unit of electric field -16.3913(16)

$$A_{ef} = ж_1{}^{5}\left(\frac{l_p\, m_e{}^2}{t_p{}^2\, q_p\, m_p}\right)\left(1 + 18\sqrt{\frac{s^8}{24\,(\,2\pi\,)^{7}}}\,(\,ж_1 + ж_3 + ж_4\,)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{ef} = 5.14220674774742 \ldots \times 10^{11}\ \mathrm{V/m}$	prediction
$A_{ef} = 5.14220675112(80) \times 10^{11}\ \mathrm{V/m}$	CODATA 2022, $\sigma = -4.22$
$A_{ef} = 5.14220674763(78) \times 10^{11}\ \mathrm{V/m}$	CODATA 2018, $\sigma = +0.15$
	$\Delta_{\text{precision}} = -0.01$
	$\Delta_{\text{scaled}} = +4.47$

atomic unit of force -16.0172(16)

$$A_{\text{force}} = ж_1{}^6 \left(\frac{l_p\, m_e{}^2}{t_p{}^2\, m_p} \right) \left(1 + 18 \sqrt{\frac{s^8}{4\,(\,2\pi\,)^8}}\; (\,ж_1 + ж_3 + ж_4\,) \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\text{force}} = 8.2387234980377 1 \ldots \times 10^{-8}$ N prediction
$A_{\text{force}} = 8.2387235038(13) \times 10^{-8}$ N CODATA 2022, $\sigma = -4.43$
$A_{\text{force}} = 8.2387234983(12) \times 10^{-8}$ N CODATA 2018, $\sigma = -0.22$
$\Delta_{\text{precision}} = -0.04$
$\Delta_{\text{scaled}} = +4.58$

atomic unit of charge density -25.9362(45)

$$A_{\text{cd}} = ж_1{}^7 \left(\frac{q_p\, m_e{}^3}{l_p{}^3\, m_p{}^3} \right) \left(1 + 18 \sqrt{\frac{s^9}{8\,(\,2\pi\,)^8}}\; (\,ж_1 + ж_3 + ж_4\,) \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, q_p = the Planck charge, m_e = the electron mass, l_p = the Planck length, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\text{cd}} = 1.08120238561797 \ldots \times 10^{12}\ \text{C/m}^3$ prediction
$A_{\text{cd}} = 1.08120238677(51) \times 10^{12}\ \text{C/m}^3$ CODATA 2022, $\sigma = -2.26$
$A_{\text{cd}} = 1.08120238457(49) \times 10^{12}\ \text{C/m}^3$ CODATA 2018, $\sigma = +2.13$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = +4.49$

neutron magnetic moment 441.5(25)

$$\mu_n = -\frac{ж_1{}^2\,ж_2{}^2}{C_{\mathrm{CFP}}}\left(\frac{l_p{}^2 q_p\, m_p}{t_p\, m_n}\right)\left(1 + 18\,(2\pi)\,(ж_1 - ж_3 - ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, C_{CFP} = the real fixed point of the hyperbolic cotangent, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_n = the neutron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_n = -9.66235818798183\ldots \times 10^{-27}$ J/T — prediction
$\mu_n = -9.6623653(23) \times 10^{-27}$ J/T — CODATA 2022, $\sigma = +3.09$
$\mu_n = -9.6623651(23) \times 10^{-27}$ J/T — CODATA 2018, $\sigma = +3.01$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.09$

neutron gyromagnetic ratio in MHz/T 436.1(24)

$$\dot{\gamma}_n = \frac{ж_1{}^2\,ж_2{}^2}{\pi\, C_{\mathrm{CFP}}}\,\frac{1}{\mathrm{MHz}}\left(\frac{q_p}{\mathrm{s}\, m_n}\right)\left(1 + 18\,(2\pi)\,(ж_1 - ж_3 - ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, π = Archimedes' constant, C_{CFP} = the fixed point of the hyperbolic cotangent, MHz = the megahertz, q_p = the Planck charge, s = the second, m_n = the neutron mass, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\gamma}_n = 2.91646871897931\ldots \times 10^{1}$ MHz/T — prediction
$\dot{\gamma}_n = 2.91646935(69) \times 10^{1}$ MHz/T — CODATA 2022, $\sigma = -0.91$
$\dot{\gamma}_n = 2.91646931(69) \times 10^{1}$ MHz/T — CODATA 2018, $\sigma = -0.86$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.06$

neutron gyromagnetic ratio 436.1(24)

$$\gamma_n = \frac{2\,ж_1{}^2\,ж_2{}^2}{C_{\mathrm{CFP}}}\left(\frac{q_p}{m_n}\right)\left(1 + 18\,(2\pi)\,(ж_1 - ж_3 - ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, C_{CFP} = the fixed point of the hyperbolic cotangent, q_p = the Planck charge, m_n = the neutron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\gamma_n = 1.83247134039396\ldots \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ prediction
$\gamma_n = 1.83247174(43) \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ CODATA 2022, $\sigma = -0.93$
$\gamma_n = 1.83247171(43) \times 10^8\ 1/\mathrm{s}\cdot\mathrm{T}$ CODATA 2018, $\sigma = -0.86$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.07$

neutron magnetic moment to Bohr magneton ratio 435.7(24)

$$\frac{\mu_n}{\mu_B} = -\frac{2\,ж_1\,ж_2{}^2}{C_{\mathrm{CFP}}}\left(\frac{m_e}{m_n}\right)\left(1 + 18\,(2\pi)\,(ж_1 - ж_3 - ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, C_{CFP} = the fixed point of the hyperbolic cotangent, m_e = the electron mass, m_n = the neutron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_n/\mu_B = -1.04187546165272\ldots \times 10^{-3}$ prediction
$\mu_n/\mu_B = -1.04187565(25) \times 10^{-3}$ CODATA 2022, $\sigma = +0.75$
$\mu_n/\mu_B = -1.04187563(25) \times 10^{-3}$ CODATA 2018, $\sigma = +0.67$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.08$

neutron magnetic moment to nuclear magneton ratio 435.7(23)

$$\frac{\mu_n}{\mu_N} = -\frac{2\, ж_1\, ж_2{}^2}{C_{\mathrm{CFP}}}\left(\frac{m_+}{m_n}\right)\left(1 + 18\,(\,2\pi\,)\,(\,ж_1 - ж_3 - ж_4\,)\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, C_{CFP} = the fixed point of the hyperbolic cotangent, m_+ = the proton mass, m_n = the neutron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_n/\mu_N = -1.91304241427759\ldots$ prediction
$\mu_n/\mu_N = -1.91304276(45)$ CODATA 2022, $\sigma = +0.77$
$\mu_n/\mu_N = -1.91304273(45)$ CODATA 2018, $\sigma = +0.70$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.07$

neutron g factor 435.7(23)

$$g_n = -\frac{4\, ж_1\, ж_2{}^2}{C_{\mathrm{CFP}}}\left(\frac{m_+}{m_n}\right)\left(1 + 18\,(\,2\pi\,)\,(\,ж_1 - ж_3 - ж_4\,)\,\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, C_{CFP} = the fixed point of the hyperbolic cotangent, m_+ = the proton mass, m_n = the neutron mass, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$g_n = -3.82608482855518\ldots$ prediction
$g_n = -3.82608552(90)$ CODATA 2022, $\sigma = +0.77$
$g_n = -3.82608545(90)$ CODATA 2018, $\sigma = +0.69$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.08$

hertz-kilogram relationship 12.37064(68)

$$\text{Hz} \vdots \text{kg} = 2\pi\left(\frac{t_p\, m_p}{\text{s}}\right)\left(1 + \frac{2}{C_{\text{CFP}}}(\,ж_2 - ж_3 - ж_4\,) \boxtimes\right)$$

Where π = Archimedes' constant, t_p = the Planck time, m_p = the Planck mass, s = the second, C_{CFP} = the fixed point of the hyperbolic cotangent, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{Hz} \vdots \text{kg} = 7.37249732369515 \ldots \times 10^{-51}$ kg prediction
$\text{Hz} \vdots \text{kg} = 7.372497323 \times 10^{-51}$ kg CODATA 2022, 10-digit match
$\text{Hz} \vdots \text{kg} = 7.372497323 \times 10^{-51}$ kg CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

hertz-atomic mass unit relationship 12.3711(29)

$$\text{Hz} \vdots \text{A}_{\text{mass}} = 2\pi\left(\frac{t_p\, m_p}{\text{s}\,\text{A}_{\text{mass}}}\right)\left(1 + \frac{2}{C_{\text{CFP}}}(\,ж_2 - ж_3 - ж_4\,) \boxtimes\right)$$

Where π = Archimedes' constant, t_p = the Planck time, m_p = the Planck mass, s = the second, A_{mass} = the atomic mass constant, C_{CFP} = the fixed point of the hyperbolic cotangent, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{Hz} \vdots \text{A}_{\text{mass}} = 4.43982166082254 \ldots \times 10^{-24}$ u prediction
$\text{Hz} \vdots \text{A}_{\text{mass}} = 4.4398216590(14) \times 10^{-24}$ u CODATA 2022, $\sigma = +1.30$
$\text{Hz} \vdots \text{A}_{\text{mass}} = 4.4398216652(13) \times 10^{-24}$ u CODATA 2018, $\sigma = -3.37$
$\Delta_{\text{precision}} = -0.03$
$\Delta_{\text{scaled}} = -4.77$

natural unit of time 12.3711(30)

$$\mathcal{N}_{\text{time}} = \left(\frac{t_p\, m_p}{m_e}\right)\left(1 + \frac{2}{C_{\text{CFP}}}(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where t_p = the Planck time, m_p = the Planck mass, m_e = the electron mass, C_{CFP} = the fixed point of the hyperbolic cotangent, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathcal{N}_{\text{time}} = 1.2880886695581\ldots \times 10^{-21}$ s prediction
$\mathcal{N}_{\text{time}} = 1.28808866644(40) \times 10^{-21}$ s CODATA 2022, $\sigma = +1.29$
$\mathcal{N}_{\text{time}} = 1.28808866819(39) \times 10^{-21}$ s CODATA 2018, $\sigma = -3.16$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = -4.49$

atomic mass unit-hertz relationship -12.37064(68)

$$\text{A}_{\text{mass}} \vdots \text{Hz} = \frac{1}{2\pi}\left(\frac{\text{A}_{\text{mass}}}{t_p\, m_p}\right)\left(1 - \frac{2}{C_{\text{CFP}}}(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where π = Archimedes' constant, A_{mass} = the atomic mass constant, t_p = the Planck time, m_p = the Planck mass, C_{CFP} = the fixed point of the hyperbolic cotangent, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{A}_{\text{mass}} \vdots \text{Hz} = 2.25234272093084\ldots \times 10^{23}$ Hz prediction
$\text{A}_{\text{mass}} \vdots \text{Hz} = 2.25234272185(70) \times 10^{23}$ Hz CODATA 2022, $\sigma = -1.31$
$\text{A}_{\text{mass}} \vdots \text{Hz} = 2.25234271871(68) \times 10^{23}$ Hz CODATA 2018, $\sigma = +3.27$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.61$

kilogram-hertz relationship -12.37064(68)

$$\text{kg} \vdots \text{Hz} = \frac{1}{2\pi}\left(\frac{\text{kg}}{t_p\, m_p}\right)\left(1 - \frac{2}{C_{\text{CFP}}}(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where π = Archimedes' constant, kg = the kilogram, t_p = the Planck time, m_p = the Planck mass, C_{CFP} = the fixed point of the hyperbolic cotangent, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{Kg} \vdots \text{Hz} = 1.35639248967168 \ldots \times 10^{50}$ Hz prediction
$\text{kg} \vdots \text{Hz} = 1.356392489 \times 10^{50}$ Hz CODATA 2022, 10-digit match
$\text{kg} \vdots \text{Hz} = 1.356392489 \times 10^{50}$ Hz CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Boltzmann constant 47.18(73)

$$k_B = \left(\frac{{l_p}^2\, m_p}{{t_p}^2\, T_p}\right)\left(1 + \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\,ж_2 - ж_3 - ж_4\,)\,⊠\right)$$

Where l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$k_B = 1.38064900009246 \ldots \times 10^{-23}$ J/K prediction
$k_B = 1.380649 \times 10^{-23}$ J/K CODATA 2022, 7-digit match
$k_B = 1.380649 \times 10^{-23}$ J/K CODATA 2018, 7-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Boltzmann constant in eV/K 47.18940(98)

$$\dddot{k}_B = \frac{\text{joule}}{\text{eV}}\left(\frac{{l_p}^2\, m_p}{{t_p}^2\, T_p}\right)\left(1 + \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\,ж_2 - ж_3 - ж_4\,)\,⊠\right)$$

Where eV = the electron-volt, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dddot{k}_B = 8.61733326153815 \ldots \times 10^{-5}$ eV/K prediction
$\dddot{k}_B = 8.617333262 \times 10^{-5}$ eV/K CODATA 2022, 9.50-digit match
$\dddot{k}_B = 8.617333262 \times 10^{-5}$ eV/K CODATA 2018, 9.50-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kelvin-joule relationship 47.18(73)

$$\mathrm{K} : \mathrm{J} = \left(\frac{l_p{}^2\, m_p\, \mathrm{K}}{t_p{}^2\, T_p} \right) \left(1 + \frac{s}{\sqrt{2}} \left(\frac{2\pi}{4K} \right) (\,ж_2 - ж_3 - ж_4\,) \boxtimes \right)$$

Where l_p = the Planck length, m_p = the Planck mass, K = the kelvin, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{K} : \mathrm{J} = 1.38064900009246\ldots \times 10^{-23}$ J prediction
$\mathrm{K} : \mathrm{J} = 1.380649 \times 10^{-23}$ J CODATA 2022, 7-digit match
$\mathrm{K} : \mathrm{J} = 1.380649 \times 10^{-23}$ J CODATA 2018, 7-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kelvin-electron volt relationship 47.18942(58)

$$\mathrm{K} : \mathrm{eV} = \frac{\text{joule}}{\mathrm{eV}} \left(\frac{l_p{}^2\, m_p\, \mathrm{K}}{t_p{}^2\, T_p} \right) \left(1 + \frac{s}{\sqrt{2}} \left(\frac{2\pi}{4K} \right) (\,ж_2 - ж_3 - ж_4\,) \boxtimes \right)$$

Where eV = the electron-volt, l_p = the Planck length, m_p = the Planck mass, K = the kelvin, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{K} : \mathrm{eV} = 8.61733326153815\ldots \times 10^{-5}$ eV prediction
$\mathrm{K} : \mathrm{eV} = 8.617333262 \times 10^{-5}$ eV CODATA 2022, 9.50-digit match
$\mathrm{K} : \mathrm{eV} = 8.617333262 \times 10^{-5}$ eV CODATA 2018, 9.50-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

electron volt-kelvin relationship -47.18942(58)

$$\text{eV} \vdots \text{K} = \text{eV}\left(\frac{t_p{}^2\, T_p}{l_p{}^2\, m_p}\right)\left(1 - \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where eV = the electron-volt, t_p = the Planck time, T_p = the Planck temperature, l_p = the Planck length, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{eV} \vdots \text{K} = 1.16045181221091 \ldots \times 10^4\ \text{K}$ prediction
$\text{eV} \vdots \text{K} = 1.160451812 \times 10^4\ \text{K}$ CODATA 2022, 10-digit match
$\text{eV} \vdots \text{K} = 1.160451812 \times 10^4\ \text{K}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

joule-kelvin relationship -47.18675(69)

$$\text{J} \vdots \text{K} = \text{joule}\left(\frac{t_p{}^2\, T_p}{l_p{}^2\, m_p}\right)\left(1 - \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where t_p = the Planck time, T_p = the Planck temperature, l_p = the Planck length, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, K = Catalan's constant, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\text{J} \vdots \text{K} = 7.24297051539357 \ldots \times 10^{22}\ \text{K}$ prediction
$\text{J} \vdots \text{K} = 7.242970516 \times 10^{22}\ \text{K}$ CODATA 2022, 9.92-digit match
$\text{J} \vdots \text{K} = 7.242970516 \times 10^{22}\ \text{K}$ CODATA 2018, 9.92-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Loschmidt constant (273.15 K, 100 kPa) -47.1889(19)

$$n_0 = \frac{p_0}{T_0}\left(\frac{{t_p}^2\, T_p}{{l_p}^2\, m_p}\right)\left(1 - \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where $p_0 = 100.000000000000$ kPa, $T_0 = 273.150000000000$ K, $t_p =$ the Planck time, $T_p =$ the Planck temperature, $l_p =$ the Planck length, $m_p =$ the Planck mass, $s =$ the arc length of the unit lemniscate, $\pi =$ Archimedes' constant, $K =$ Catalan's constant, $\text{ж}_2 =$ the 2nd hyperbolic partition constant, $\text{ж}_3 =$ the 3rd hyperbolic partition constant, $\text{ж}_4 =$ the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$n_0 = 2.651645804\,64711\ldots \times 10^{25}\ 1/\text{m}^3$ prediction
$n_0 = 2.651645804 \times 10^{25}\ 1/\text{m}^3$ CODATA 2022, 10-digit match
$n_0 = 2.651645804 \times 10^{25}\ 1/\text{m}^3$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Loschmidt constant (273.15 K, 101.325 kPa) -47.1885(19)

$$n_1 = \frac{p_1}{T_0}\left(\frac{{t_p}^2\, T_p}{{l_p}^2\, m_p}\right)\left(1 - \frac{s}{\sqrt{2}}\left(\frac{2\pi}{4K}\right)(\text{ж}_2 - \text{ж}_3 - \text{ж}_4)\boxtimes\right)$$

Where $p_1 = 101.325000000000$ kPa, $T_0 = 273.150000000000\ K$, $t_p =$ the Planck time, $T_p =$ the Planck temperature, $l_p =$ the Planck length, $m_p =$ the Planck mass, $s =$ the arc length of the unit lemniscate, $\pi =$ Archimedes' constant, $K =$ Catalan's constant, $\text{ж}_2 =$ the 2nd hyperbolic partition constant, $\text{ж}_3 =$ the 3rd hyperbolic partition constant, $\text{ж}_4 =$ the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$n_1 = 2.686780111\,155868\ldots \times 10^{25}\ 1/\text{m}^3$ prediction
$n_1 = 2.686780111 \times 10^{25}\ 1/\text{m}^3$ CODATA 2022, 10-digit match
$n_1 = 2.686780111 \times 10^{25}\ 1/\text{m}^3$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Bohr magneton in K/T -41.6669(30)

$$\frac{\mu_B}{k_B} = \frac{ж_1}{2}\left(\frac{t_p\, q_p\, T_p}{m_e}\right)\left(1 - \sqrt{\frac{32}{G_{\mathrm{Gi}}}\,(ж_2 - ж_3 - ж_4)\,⊠}\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, T_p = the Planck temperature, m_e = the electron mass, G_{Gi} = Gieseking's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_B/k_B = 6.71713814961807 \ldots \times 10^{-1}$ K/T prediction
$\mu_B/k_B = 6.7171381472(21) \times 10^{-1}$ K/T CODATA 2022, $\sigma = +1.15$
$\mu_B/k_B = 6.7171381563(20) \times 10^{-1}$ K/T CODATA 2018, $\sigma = -3.34$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.55$

nuclear magneton in K/T -41.6669(30)

$$\frac{\mu_N}{k_B} = \frac{ж_1}{2}\left(\frac{t_p\, q_p\, T_p}{m_+}\right)\left(1 - \sqrt{\frac{32}{G_{\mathrm{Gi}}}\,(ж_2 - ж_3 - ж_4)\,⊠}\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, T_p = the Planck temperature, m_+ = the proton mass, G_{Gi} = Gieseking's constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_N/k_B = 3.65826777199876 \ldots \times 10^{-4}$ K/T prediction
$\mu_N/k_B = 3.6582677706(11) \times 10^{-4}$ K/T CODATA 2022, $\sigma = +1.27$
$\mu_N/k_B = 3.6582677756(11) \times 10^{-4}$ K/T CODATA 2018, $\sigma = -3.27$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = -4.55$

Rydberg constant times hc in J $-7.243621(11)$

$$R_{\infty}hc = \frac{ж_1{}^4}{2}\left(\frac{{l_p}^2\, m_e}{{t_p}^2}\right)\left(1 + \sqrt{35}\,(8\,D_d)\,(ж_2 + ж_3 + ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, D_d = the dimer constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$R_{\infty}hc = 2.17987236111219 \ldots \times 10^{-18}$ J prediction
$R_{\infty}hc = 2.1798723611030(24) \times 10^{-18}$ J CODATA 2022, $\sigma = +3.83$
$R_{\infty}hc = 2.1798723611035(42) \times 10^{-18}$ J CODATA 2018, $\sigma = +2.07$
$\Delta_{\text{precision}} = +0.24$
$\Delta_{\text{scaled}} = -0.12$

Hartree energy $-7.243622(11)$

$$E_h = ж_1{}^4\left(\frac{{l_p}^2\, m_e}{{t_p}^2}\right)\left(1 + \sqrt{35}\,(8\,D_d)\,(ж_2 + ж_3 + ж_4)\,⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, m_e = the electron mass, t_p = the Planck time, D_d = the dimer constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_h = 4.35974472222439 \ldots \times 10^{-18}$ J prediction
$E_h = 4.3597447222060(48) \times 10^{-18}$ J CODATA 2022, $\sigma = +3.83$
$E_h = 4.3597447222071(85) \times 10^{-18}$ J CODATA 2018, $\sigma = +2.03$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.13$

Also listed as the *atomic unit of energy*, and the *hartree-joule relationship*.

joule-hartree relationship 7.243627(11)

$$J : E_h = \frac{\text{joule}^2}{\text{ж}_1{}^4}\left(\frac{t_p{}^2}{l_p{}^2\, m_e}\right)\left(1 + \sqrt{35}\,(8\, D_d)\,(\text{ж}_2 + \text{ж}_3 + \text{ж}_4)\,\boxtimes\right)$$

Where ж_1 = the 1st hyperbolic partition constant, t_p = the Planck time, l_p = the Planck length, m_e = the electron mass, D_d = the dimer constant, ж_2 = the 2nd hyperbolic partition constant, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$J : E_h = 2.29371227838603 \ldots \times 10^{17}\ E_h$ prediction
$J : E_h = 2.2937122783969(25) \times 10^{17}\ E_h$ CODATA 2022, $\sigma = -4.35$
$J : E_h = 2.2937122783963(45) \times 10^{17}\ E_h$ CODATA 2018, $\sigma = -2.28$
$\Delta_{\text{precision}} = +0.26$
$\Delta_{\text{scaled}} = +0.13$

Josephson constant -4.7726(05)

$$K_J = \frac{ж_1}{\pi}\left(\frac{t_p\, q_p}{{l_p}^2\, m_p}\right)\left(1 - \frac{7}{8}\left(\frac{8}{4\pi}\right)^2 \left({ж_1}^2 + {ж_2}^2\right) ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, π = Archimedes' constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_p = the Planck mass, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$K_J = 4.83597848424072 \ldots \times 10^{14}$ Hz/V prediction
$K_J = 4.835978484 \times 10^{14}$ Hz/V CODATA 2022, 10-digit match
$K_J = 4.835978484 \times 10^{14}$ Hz/V CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Also listed as the *conventional value of Josephson constant*.

elementary charge over h-bar -4.7771(14)

$$\frac{e}{\hbar} = ж_1\left(\frac{t_p\, q_p}{{l_p}^2\, m_p}\right)\left(1 - \frac{7}{8}\left(\frac{8}{4\pi}\right)^2 \left({ж_1}^2 + {ж_2}^2\right) ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, l_p = the Planck length, m_p = the Planck mass, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$e/\hbar = 1.51926744790089 \ldots \times 10^{15}$ A/J prediction
$e/\hbar = 1.519267447 \times 10^{15}$ A/J CODATA 2022, 10-digit match
$e/\hbar = 1.519267447 \times 10^{15}$ A/J CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

magnetic flux quantum 4.7717(12)

$$\Phi_0 = \frac{\pi}{ж_1}\left(\frac{{l_p}^2\, m_p}{t_p\, q_p}\right)\left(1 + \frac{7}{8}\left(\frac{8}{4\pi}\right)^2 \left({ж_1}^2 + {ж_2}^2\right) ⊠\right)$$

Where $\pi =$ Archimedes' constant, $ж_1 =$ the 1st hyperbolic partition constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, $ж_2$ = the 2nd hyperbolic partition constant, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\Phi_0 = 2.06783384843115 \ldots \times 10^{-15}$ Wb prediction
$\Phi_0 = 2.067833848 \times 10^{-15}$ Wb CODATA 2022, 10-digit match
$\Phi_0 = 2.067833848 \times 10^{-15}$ Wb CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

reduced Planck constant in eV s 4.77270(38)

$$\frac{\hbar}{e} = \frac{1}{ж_1}\left(\frac{{l_p}^2\, \mathrm{C}\, m_p}{t_p\, q_p}\right)\left(1 + \frac{7}{8}\left(\frac{8}{4\pi}\right)^2 \left({ж_1}^2 + {ж_2}^2\right) ⊠\right)$$

Where $ж_1 =$ the 1st hyperbolic partition constant, l_p = the Planck length, C = the coulomb, m_p = the Planck mass, t_p = the Planck time, q_p = the Planck charge, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\hbar/e = 6.58211956941109 \ldots \times 10^{-16}$ eV · s prediction
$\hbar/e = 6.582119569 \times 10^{-16}$ eV · s CODATA 2022, 10-digit match
$\hbar/e = 6.582119569 \times 10^{-16}$ eV · s CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Planck constant in eV/Hz 4.77117(60)

$$\frac{h}{e} = \frac{2\pi}{ж_1}\left(\frac{{l_p}^2\,\mathrm{C}\,m_p}{t_p\,q_p}\right)\left(1 + \frac{7}{8}\left(\frac{8}{4\pi}\right)^2\left({ж_1}^2 + {ж_2}^2\right)⊠\right)$$

Where $\pi =$ Archimedes' constant, $ж_1 =$ the 1st hyperbolic partition constant, $l_p =$ the Planck length, $\mathrm{C} =$ the coulomb, $m_p =$ the Planck mass, $t_p =$ the Planck time, $q_p =$ the Planck charge, $ж_2 =$ the 2nd hyperbolic partition constant, $\pi =$ Archimedes' constant, $ж_2 =$ the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$h/e = 4.13566769686229 \ldots \times 10^{-15}$ eV/Hz prediction
$h/e = 4.135667696 \times 10^{-15}$ eV/Hz CODATA 2022, 10-digit match
$h/e = 4.135667696 \times 10^{-15}$ eV/Hz CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

first radiation constant -2.0763(14)

$$c_1 = (2\pi)^2 \left(\frac{l_p{}^4 \, m_p}{t_p{}^3} \right) \left(1 - \left(\frac{4\pi}{32} \right)^2 (ж_1{}^2 + ж_2{}^2) \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$c_1 = 3.74177185285687 \ldots \times 10^{-16}\ \mathrm{W \cdot m^2}$ prediction
$c_1 = 3.741771852 \times 10^{-16}\ \mathrm{W \cdot m^2}$ CODATA 2022, 10-digit match
$c_1 = 3.741771852 \times 10^{-16}\ \mathrm{W \cdot m^2}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

first radiation constant for spectral radiance -2.0763(42)

$$c_{1\mathrm{L}} = 4\pi \left(\frac{l_p{}^4 \, m_p}{t_p{}^3} \right) \left(1 - \left(\frac{4\pi}{32} \right)^2 (ж_1{}^2 + ж_2{}^2) \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, t_p = the Planck time, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$c_{1\mathrm{L}} = 1.19104297260858 \ldots \times 10^{-16}\ \mathrm{W \cdot m^2/sr}$ prediction
$c_{1\mathrm{L}} = 1.191042972 \times 10^{-16}\ \mathrm{W \cdot m^2/sr}$ CODATA 2022, 10-digit match
$c_{1\mathrm{L}} = 1.191042972 \times 10^{-16}\ \mathrm{W \cdot m^2/sr}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

shielded helion gyromagnetic ratio -3.9241(88)

$$\gamma_{\text{he}}' = \frac{C_{\text{CFP}}^{\ 2}}{\sqrt{7}} \left(\frac{q_p}{m_{\text{he}}} \right) \left(1 - C_d \left(ж_1^{\ 2} + ж_2^{\ 2} \right) ⊠ \right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, q_p = the Planck charge, m_{he} = the helion mass, C_d = the domino tiling constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\gamma_{\text{he}}' = 2.03789460878416 \ldots \times 10^8 \ 1/\text{s} \cdot \text{T}$ prediction
$\gamma_{\text{he}}' = 2.0378946078(18) \times 10^8 \ 1/\text{s} \cdot \text{T}$ CODATA 2022, $\sigma = +0.55$
$\gamma_{\text{he}}' = 2.037894569(24) \times 10^8 \ 1/\text{s} \cdot \text{T}$ CODATA 2018, $\sigma = +1.66$
$\Delta_{\text{precision}} = +1.13$
$\Delta_{\text{scaled}} = +1.58$

shielded helion gyromagnetic ratio in MHz/T -3.9241(88)

$$\dot{\gamma}_{\text{he}}' = \frac{C_{\text{CFP}}^{\ 2}}{2\pi \sqrt{7} \ \text{MHz}} \left(\frac{q_p}{\text{s} \ m_{\text{he}}} \right) \left(1 - C_d \left(ж_1^{\ 2} + ж_2^{\ 2} \right) ⊠ \right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, π = Archimedes' constant, MHz = the megahertz, q_p = the Planck charge, s = the second, m_{he} = the helion mass, C_d = the domino tiling constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\dot{\gamma}_{\text{he}}' = 3.24341000488323 \ldots \times 10^1 \ \text{MHz/T}$ prediction
$\dot{\gamma}_{\text{he}}' = 3.2434100033(28) \times 10^1 \ \text{MHz/T}$ CODATA 2022, $\sigma = +0.57$
$\dot{\gamma}_{\text{he}}' = 3.243409942(38) \times 10^1 \ \text{MHz/T}$ CODATA 2018, $\sigma = +1.65$
$\Delta_{\text{precision}} = +0.13$
$\Delta_{\text{scaled}} = +1.61$

helion magnetic moment 600.9249(87)

$$\mu_{\text{he}} = -\frac{C_{\text{CFP}}{}^2}{2\sqrt{7}}\left(\frac{l_p{}^2\, q_p\, m_p}{t_p\, m_{\text{he}}}\right)\left(1 + 5\left(\frac{16}{D_d}\right)\left(ж_1{}^2 + ж_2{}^2\right)⊠\right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_{he} = the helion mass, D_d = the dimer constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{\text{he}} = -1.07461755420270 \ldots \times 10^{-26}$ J/T prediction
$\mu_{\text{he}} = -1.07461755198(93) \times 10^{-26}$ J/T CODATA 2022, $\sigma = -2.39$
$\mu_{\text{he}} = -1.074617532(13) \times 10^{-26}$ J/T CODATA 2018, $\sigma = -1.71$
$\Delta_{\text{precision}} = +1.15$
$\Delta_{\text{scaled}} = +1.38$

shielded helion magnetic moment 1.2231(87)

$$\mu_{\text{he}}{}' = -\frac{C_{\text{CFP}}{}^2}{2\sqrt{7}}\left(\frac{l_p{}^2\, q_p\, m_p}{t_p\, m_{\text{he}}}\right)\left(1 + \frac{1}{7}\left(\frac{8}{4\pi}\right)\left(ж_1{}^2 + ж_2{}^2\right)⊠\right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, t_p = the Planck time, m_{he} = the helion mass, π = Archimedes' constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mu_{\text{he}}{}' = -1.07455311098442 \ldots \times 10^{-26}$ J/T prediction
$\mu_{\text{he}}{}' = -1.07455311035(93) \times 10^{-26}$ J/T CODATA 2022, $\sigma = +0.68$
$\mu_{\text{he}}{}' = -1.074553090(13) \times 10^{-26}$ J/T CODATA 2018, $\sigma = +1.61$
$\Delta_{\text{precision}} = +1.15$
$\Delta_{\text{scaled}} = +1.54$

shielded helion to proton magnetic moment ratio 320.1798(87)

$$\frac{\mu_{\text{he}}'}{\mu_+} = -\frac{C_{\text{CFP}}{}^2}{2\sqrt{7}} \frac{S}{\text{ж}_1{}^2\,\text{ж}_2{}^2}\left(\frac{m_+}{m_{\text{he}}}\right)\left(1 - \sqrt{12}\,L^2\left(\text{ж}_1{}^2 - \text{ж}_2{}^2\right)\boxtimes\right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, S = Sierpiński's constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, m_+ = the proton mass, m_{he} = the helion mass, L = the lemniscate constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{he}}'/\mu_+ = -7.61766577306786\ldots \times 10^{-1}$ prediction
$\mu_{\text{he}}'/\mu_+ = -7.6176657721(66) \times 10^{-1}$ CODATA 2022, $\sigma = -0.15$
$\mu_{\text{he}}'/\mu_+ = -7.617665618(89) \times 10^{-1}$ CODATA 2018, $\sigma = +1.74$
$\Delta_{\text{precision}} = +1.13$
$\Delta_{\text{scaled}} = +1.73$

shielded helion to shielded proton magnetic moment ratio 576.910(41)

$$\frac{\mu_{\text{he}}'}{\mu_+'} = -\frac{C_{\text{CFP}}{}^2}{2\sqrt{7}} \frac{S}{\text{ж}_1{}^2\,\text{ж}_2{}^2}\left(\frac{m_+}{m_{\text{he}}}\right)\left(1 + \frac{\pi}{\sqrt{12}}\,L^4\left(\text{ж}_1{}^2 + \text{ж}_2{}^2\right)\boxtimes\right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, S = Sierpiński's constant, ж_1 = the 1st hyperbolic partition constant, ж_2 = the 2nd hyperbolic partition constant, m_+ = the proton mass, m_{he} = the helion mass, π =Archimedes' constant, L = the lemniscate constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_{\text{he}}'/\mu_+' = -7.61786134617088\ldots \times 10^{-1}$ prediction
$\mu_{\text{he}}'/\mu_+' = -7.617861334(31) \times 10^{-1}$ CODATA 2022, $\sigma = -0.39$
$\mu_{\text{he}}'/\mu_+' = -7.617861313(33) \times 10^{-1}$ CODATA 2018, $\sigma = -1.00$
$\Delta_{\text{precision}} = +0.03$
$\Delta_{\text{scaled}} = +0.64$

electron to shielded helion magnetic moment ratio 654.1948(81)

$$\frac{\mu_e}{\mu_{\text{he}}'} = \frac{2\sqrt{\mathbf{7}}}{C_{\text{CFP}}^{\;2}} \frac{ж_1^{\;2}\,ж_2^{\;2}}{P_{up}} \left(\frac{m_{\text{he}}}{m_e}\right)\left(1 + \frac{2e^{\gamma}}{\sqrt{12}}\,L^4\left(ж_1^{\;2} + ж_2^{\;2}\right)\boxtimes\right)$$

Where C_{CFP} = the fixed point of the hyperbolic cotangent, $ж_1$ = the 1st hyperbolic partition constant, $ж_2$ = the 2nd hyperbolic partition constant, P_{up} = the universal parabolic constant, m_{he} = the helion mass, m_e = the electron mass, e = Euler's number, γ = the Euler-Mascheroni constant, L = the lemniscate constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mu_e/\mu_{\text{he}}' = 8.64058236541607\ldots \times 10^2$ prediction

$\mu_e/\mu_{\text{he}}' = 8.6405823986(70) \times 10^2$ CODATA 2022, $\sigma = -4.74$

$\mu_e/\mu_{\text{he}}' = 8.64058257(10) \times 10^2$ CODATA 2018, $\sigma = -2.05$

$\Delta_{\text{precision}} = +1.15$

$\Delta_{\text{scaled}} = -2.80$

atomic mass unit-hartree relationship -1.3473(31)

$$A_{mass} ⋮ E_h = \sqrt{\frac{18}{32}\frac{P_{up}}{ж_1{}^{14}}}\left(1 + \frac{\zeta(3)}{12}\left(ж_1{}^2 - ж_2{}^2\right)⊠\right)$$

Where P_{up} = the universal parabolic constant, $ж_1$ = the 1st hyperbolic partition constant, $\zeta(x)$ = the Riemann zeta function, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$A_{mass} ⋮ E_h = 3.42317769077001 \ldots \times 10^7$ E_h prediction
$A_{mass} ⋮ E_h = 3.4231776922(11) \times 10^7$ E_h CODATA 2022, $\sigma = -1.30$
$A_{mass} ⋮ E_h = 3.4231776874(10) \times 10^7$ E_h CODATA 2018, $\sigma = +3.37$
$\Delta_{precision} = -0.04$
$\Delta_{scaled} = +4.80$

hartree-atomic mass unit relationship 1.3473(31)

$$E_h ⋮ A_{mass} = \sqrt{\frac{32}{18}\frac{ж_1{}^{14}}{P_{up}}}\left(1 - \frac{\zeta(3)}{12}\left(ж_1{}^2 - ж_2{}^2\right)⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, $\zeta(x)$ = the Riemann zeta function, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$E_h ⋮ A_{mass} = 2.92126231920798 \ldots \times 10^{-8}$ u prediction
$E_h ⋮ A_{mass} = 2.92126231797(91) \times 10^{-8}$ u CODATA 2022, $\sigma = +1.36$
$E_h ⋮ A_{mass} = 2.92126232205(88) \times 10^{-8}$ u CODATA 2018, $\sigma = -3.23$
$\Delta_{precision} = -0.02$
$\Delta_{scaled} = -4.64$

kilogram-hartree relationship -1.346674(10)

$$\mathrm{kg} : E_h = \sqrt{\frac{18}{32}\frac{P_{up}}{ж_1{}^{14}}}\left(\frac{\mathrm{kg}}{\mathrm{A_{mass}}}\right)\left(1 + \frac{\zeta(3)}{12}\left(ж_1{}^2 - ж_2{}^2\right)\boxtimes\right)$$

Where P_{up} = the universal parabolic constant, $ж_1$ = the 1st hyperbolic partition constant, kg = the kilogram, $\mathrm{A_{mass}}$ = the atomic mass constant, $\zeta(x)$ = the Riemann zeta function, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$\mathrm{kg} : E_h = 2.06148578874053 \ldots \times 10^{34}\ E_h$ prediction
$\mathrm{kg} : E_h = 2.0614857887415(22) \times 10^{34}\ E_h$ CODATA 2022, $\sigma = -0.44$
$\mathrm{kg} : E_h = 2.0614857887409(40) \times 10^{34}\ E_h$ CODATA 2018, $\sigma = -0.09$
$\Delta_{\mathrm{precision}} = +0.26$
$\Delta_{\mathrm{scaled}} = +0.15$

hartree-kilogram relationship 1.346675(11)

$$E_h : \mathrm{kg} = \sqrt{\frac{32}{18}\frac{ж_1{}^{14}}{P_{up}}}\left(\mathrm{A_{mass}}\right)\left(1 - \frac{\zeta(3)}{12}\left(ж_1{}^2 - ж_2{}^2\right)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, P_{up} = the universal parabolic constant, $\mathrm{A_{mass}}$ = the atomic mass constant, $\zeta(x)$ = the Riemann zeta function, $ж_2$ = the 2nd hyperbolic partition constant, and ⊠= the hyperbolic inversion boundary.

$E_h : \mathrm{kg} = 4.85087020954402 \ldots \times 10^{-35}$ kg prediction
$E_h : \mathrm{kg} = 4.8508702095419(53) \times 10^{-35}$ kg CODATA 2022, $\sigma = +0.40$
$E_h : \mathrm{kg} = 4.8508702095432(94) \times 10^{-35}$ kg CODATA 2018, $\sigma = +0.09$
$\Delta_{\mathrm{precision}} = +0.25$
$\Delta_{\mathrm{scaled}} = -0.14$

kelvin-kilogram relationship 54.41184(77)

$$\mathrm{K} \vdots \mathrm{kg} = \left(\frac{\mathrm{K}\, m_p}{T_p} \right) \left(1 - L_2 \sqrt{6\mathrm{V_{fe}}} \left(ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where K = the kelvin, m_p = the Planck mass, T_p = the Planck temperature, L_2 = the 2nd lemniscate constant, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{K} \vdots \mathrm{kg} = 1.53617918688372 \ldots \times 10^{-40}$ kg prediction
$\mathrm{K} \vdots \mathrm{kg} = 1.536179187 \times 10^{-40}$ kg CODATA 2022, 9.93-digit match
$\mathrm{K} \vdots \mathrm{kg} = 1.536179187 \times 10^{-40}$ kg CODATA 2018, 9.93-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kilogram-kelvin relationship -54.41184(77)

$$\mathrm{kg} \vdots \mathrm{K} = \left(\frac{T_p\, \mathrm{kg}}{m_p} \right) \left(1 + L_2 \sqrt{6\mathrm{V_{fe}}} \left(ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where T_p = the Planck temperature, m_p = the Planck mass, L_2 = the 2nd lemniscate constant, $\mathrm{V_{fe}}$ = the figure-eight knot hyperbolic volume, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{kg} \vdots \mathrm{K} = 6.50965726204757 \ldots \times 10^{39}$ K prediction
$\mathrm{kg} \vdots \mathrm{K} = 6.509657260 \times 10^{39}$ K CODATA 2022, 9.50-digit match
$\mathrm{kg} \vdots \mathrm{K} = 6.509657260 \times 10^{39}$ K CODATA 2018, 9.50-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kelvin-atomic mass unit relationship 54.4119(31)

$$\mathrm{K} \vdots \mathrm{A}_{\mathrm{mass}} = \left(\frac{\mathrm{K}\, m_p}{T_p\, \mathrm{A}_{\mathrm{mass}}} \right) \left(1 - L_2 \sqrt{6\mathrm{V}_{\mathrm{fe}}} \left(ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where $\mathrm{A}_{\mathrm{mass}}$ = the atomic mass constant, m_p = the Planck mass, T_p = the Planck temperature, L_2 = the 2nd lemniscate constant, V_{fe} = the figure-eight knot hyperbolic volume, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{K} \vdots \mathrm{A}_{\mathrm{mass}} = 9.251087290205610 \ldots \times 10^{-14}$ u — prediction
$\mathrm{K} \vdots \mathrm{A}_{\mathrm{mass}} = 9.2510872884(29) \times 10^{-14}$ u — CODATA 2022, $\sigma = +0.62$
$\mathrm{K} \vdots \mathrm{A}_{\mathrm{mass}} = 9.2510873014(28) \times 10^{-14}$ u — CODATA 2018, $\sigma = -4.00$
$\Delta_{\mathrm{precision}} = -0.02$
$\Delta_{\mathrm{scaled}} = -4.64$

atomic mass unit-kelvin relationship -54.4119(31)

$$\mathrm{A}_{\mathrm{mass}} \vdots \mathrm{K} = \left(\frac{T_p\, \mathrm{A}_{\mathrm{mass}}}{m_p} \right) \left(1 + L_2 \sqrt{6\mathrm{V}_{\mathrm{fe}}} \left(ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where T_p = the Planck temperature, $\mathrm{A}_{\mathrm{mass}}$ = the atomic mass constant, m_p = the Planck mass, L_2 = the 2nd lemniscate constant, V_{fe} = the figure-eight knot hyperbolic volume, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{A}_{\mathrm{mass}} \vdots \mathrm{K} = 1.0809540204307 9 \ldots \times 10^{13}$ K — prediction
$\mathrm{A}_{\mathrm{mass}} \vdots \mathrm{K} = 1.08095402067(34) \times 10^{13}$ K — CODATA 2022, $\sigma = -0.70$
$\mathrm{A}_{\mathrm{mass}} \vdots \mathrm{K} = 1.08095401916(33) \times 10^{13}$ K — CODATA 2018, $\sigma = +3.58$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = +4.58$

kilogram-inverse meter relationship 8.7598(22)

$$\text{kg} \vdots \frac{1}{\text{m}} = \frac{1}{2\pi}\left(\frac{\text{kg}}{l_p\, m_p}\right)\left(1 - \frac{P_{up}\, i}{8}\left(\text{ж}_3{}^2 - \text{ж}_4{}^2\right) \boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, P_{up} = the universal parabolic constant, i = the imaginary unit, ж_3 = the 3rd hyperbolic partition constant ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{Kg} \vdots 1/\text{m} = 4.524438335\,98084 \ldots \times 10^{41}$ cycles/m prediction
$\text{kg} \vdots 1/\text{m} = 4.524438335 \times 10^{41}$ cycles/m CODATA 2022, 10-digit match
$\text{kg} \vdots 1/\text{m} = 4.524438335 \times 10^{41}$ cycles/m CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

atomic mass unit-inverse meter relationship -8.7591(30)

$$\text{A}_{\text{mass}} \vdots \frac{1}{\text{m}} = \frac{1}{2\pi}\left(\frac{\text{A}_{\text{mass}}}{l_p\, m_p}\right)\left(1 - \frac{P_{up}\, i}{8}\left(\text{ж}_3{}^2 - \text{ж}_4{}^2\right) \boxtimes\right)$$

Where π = Archimedes' constant, A_{mass} = the atomic mass constant, l_p = the Planck length, m_p = the Planck mass, P_{up} = the universal parabolic constant, i = the imaginary unit, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\text{A}_{\text{mass}} \vdots 1/\text{m} = 7.51300661861781 \ldots \times 10^{14}$ cycles/m prediction
$\text{A}_{\text{mass}} \vdots 1/\text{m} = 7.5130066209(23) \times 10^{14}$ cycles/m CODATA 2022, $\sigma = +0.99$
$\text{A}_{\text{mass}} \vdots 1/\text{m} = 7.5130066104(23) \times 10^{14}$ cycles/m CODATA 2018, $\sigma = +3.57$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +4.57$

inverse meter-kilogram relationship 8.7598(22)

$$\frac{1}{\mathrm{m}} \vdots \mathrm{kg} = 2\pi \left(\frac{l_p\, m_p}{\mathrm{m}} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m = the meter, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$1/\mathrm{m} \vdots \mathrm{kg} = 2.21021909404020 \ldots \times 10^{-42}$ kg prediction
$1/\mathrm{m} \vdots \mathrm{kg} = 2.210219094 \times 10^{-42}$ kg CODATA 2022, 10-digit match
$1/\mathrm{m} \vdots \mathrm{kg} = 2.210219094 \times 10^{-42}$ kg CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

inverse meter-atomic mass unit relationship 8.7591(30)

$$\frac{1}{\mathrm{m}} \vdots \mathrm{A_{mass}} = 2\pi \left(\frac{l_p\, m_p}{\mathrm{m}\, \mathrm{A_{mass}}} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) \boxtimes \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m = the meter, $\mathrm{A_{mass}}$ = the atomic mass constant, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$1/\mathrm{m} \vdots \mathrm{A_{mass}} = 1.33102504864185 \ldots \times 10^{-15}$ u prediction
$1/\mathrm{m} \vdots \mathrm{A_{mass}} = 1.33102504824(41) \times 10^{-15}$ u CODATA 2022, $\sigma = +0.98$
$1/\mathrm{m} \vdots \mathrm{A_{mass}} = 1.33102505010(40) \times 10^{-15}$ u CODATA 2018, $\sigma = -3.65$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = -4.65$

Compton wavelength 8.7590(30)

$$\lambda_C = 2\pi\left(\frac{l_p\, m_p}{m_e}\right)\left(1 + \frac{P_{up}\, i}{8}\left(\text{ж}_3{}^2 - \text{ж}_4{}^2\right)\boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, P_{up} = the universal parabolic constant, i = the imaginary unit, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_C = 2.42631023609293\ldots \times 10^{-12}$ m/cycle prediction
$\lambda_C = 2.42631023538(76) \times 10^{-12}$ m/cycle CODATA 2022, $\sigma = +0.94$
$\lambda_C = 2.42631023867(73) \times 10^{-12}$ m/cycle CODATA 2018, $\sigma = -3.53$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.63$

muon Compton wavelength 8.72(22)

$$\lambda_\mu = 2\pi\left(\frac{l_p\, m_p}{m_\mu}\right)\left(1 + \frac{P_{up}\, i}{8}\left(\text{ж}_3{}^2 - \text{ж}_4{}^2\right)\boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m_μ = the muon mass, P_{up} = the universal parabolic constant, i = the imaginary unit, ж_3 = the 3rd hyperbolic partition constant, ж_4 = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_\mu = 1.17344411764093\ldots \times 10^{-14}$ m/cycle prediction
$\lambda_\mu = 1.173444110(26) \times 10^{-14}$ m/cycle CODATA 2022, $\sigma = +0.29$
$\lambda_\mu = 1.173444110(26) \times 10^{-14}$ m/cycle CODATA 2018, $\sigma = +0.29$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

proton Compton wavelength 8.7591(30)

$$\lambda_+ = 2\pi \left(\frac{l_p\, m_p}{m_+} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m_+ = the proton mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\lambda_+ = 1.32140985399774 \ldots \times 10^{-15}$ m/cycle prediction
$\lambda_+ = 1.32140985360(41) \times 10^{-15}$ m/cycle CODATA 2022, $\sigma = +0.97$
$\lambda_+ = 1.32140985539(40) \times 10^{-15}$ m/cycle CODATA 2018, $\sigma = -3.48$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = -4.48$

neutron Compton wavelength 8.7601(56)

$$\lambda_n = 2\pi \left(\frac{l_p\, m_p}{m_n} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m_n = the neutron mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\lambda_n = 1.31959090499128 \ldots \times 10^{-15}$ m/cycle prediction
$\lambda_n = 1.31959090382(67) \times 10^{-15}$ m/cycle CODATA 2022, $\sigma = +1.75$
$\lambda_n = 1.31959090581(75) \times 10^{-15}$ m/cycle CODATA 2018, $\sigma = -1.09$
$\Delta_{\text{precision}} = +0.05$
$\Delta_{\text{scaled}} = -2.65$

tau Compton wavelength 35.(672)

$$\lambda_\tau = 2\pi\left(\frac{l_p\, m_p}{m_\tau}\right)\left(1 + \frac{P_{up}\, i}{8}\left(ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, m_p = the Planck mass, m_τ = the tau mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_\tau = 6.97770282157982\ldots \times 10^{-16}$ m/cycle	prediction
$\lambda_\tau = 6.97771(47) \times 10^{-16}$ m/cycle	CODATA 2022, $\sigma = -0.02$
$\lambda_\tau = 6.97771(47) \times 10^{-16}$ m/cycle	CODATA 2018, $\sigma = -0.02$
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = +0.00$

reduced Compton wavelength 8.7591(31)

$$\lambda_{\_} = \left(\frac{l_p\, m_p}{m_e}\right)\left(1 + \frac{P_{up}\, i}{8}\left(ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

Where l_p = the Planck length, m_p = the Planck mass, m_e = the electron mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_{\_} = 3.86159267548653\ldots \times 10^{-13}$ m/cycle	prediction
$\lambda_{\_} = 3.8615926744(12) \times 10^{-13}$ m/cycle	CODATA 2022, $\sigma = +0.91$
$\lambda_{\_} = 3.8615926796(12) \times 10^{-13}$ m/cycle	CODATA 2018, $\sigma = -4.55$
	$\Delta_{\text{precision}} = +0.00$
	$\Delta_{\text{scaled}} = -4.33$

Also listed as the *natural unit of length*.

reduced muon Compton wavelength 8.72(23)

$$\lambda_{\mu\_} = \left(\frac{l_p \, m_p}{m_\mu} \right) \left(1 + \frac{P_{up} \, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) \boxtimes \right)$$

Where l_p = the Planck length, m_p = the Planck mass, m_μ = the muon mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_{\mu\_} = 1.8675943 1764662 \ldots \times 10^{-15}$ m/cycle — prediction

$\lambda_{\mu\_} = 1.867594306(42) \times 10^{-15}$ m/cycle — CODATA 2022, $\sigma = +0.28$

$\lambda_{\mu\_} = 1.867594306(42) \times 10^{-15}$ m/cycle — CODATA 2018, $\sigma = +0.28$

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +0.00$

reduced proton Compton wavelength 8.7591(31)

$$\lambda_{+\_} = \left(\frac{l_p \, m_p}{m_+} \right) \left(1 + \frac{P_{up} \, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) \boxtimes \right)$$

Where l_p = the Planck length, m_p = the Planck mass, m_+ = the proton mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\lambda_{+\_} = 2.10308910114080 \ldots \times 10^{-16}$ m/cycle — prediction

$\lambda_{+\_} = 2.10308910051(66) \times 10^{-16}$ m/cycle — CODATA 2022, $\sigma = +0.96$

$\lambda_{+\_} = 2.10308910336(64) \times 10^{-16}$ m/cycle — CODATA 2018, $\sigma = -3.47$

$\Delta_{\text{precision}} = -0.01$

$\Delta_{\text{scaled}} = -4.45$

reduced neutron Compton wavelength 8.7603(58)

$$\lambda_{n\_} = \left(\frac{l_p\, m_p}{m_n} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) ⊠ \right)$$

Where l_p = the Planck length, m_p = the Planck mass, m_n = the neutron mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\lambda_{n\_}$ = 2.10019415388470 ... × 10^{-16} m/cycle — prediction
$\lambda_{n\_}$ = 2.1001941520(11) × 10^{-16} m/cycle — CODATA 2022, $\sigma = +1.71$
$\lambda_{n\_}$ = 2.1001941552(12) × 10^{-16} m/cycle — CODATA 2018, $\sigma = -1.10$
$\Delta_{\text{precision}} = +0.04$
$\Delta_{\text{scaled}} = -2.67$

reduced tau Compton wavelength 43.(675)

$$\lambda_{\tau\_} = \left(\frac{l_p\, m_p}{m_\tau} \right) \left(1 + \frac{P_{up}\, i}{8} \left(ж_3{}^2 - ж_4{}^2 \right) ⊠ \right)$$

Where l_p = the Planck length, m_p = the Planck mass, m_τ = the tau mass, P_{up} = the universal parabolic constant, i = the imaginary unit, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\lambda_{\tau\_}$ = 1.11053589548069 ... × 10^{-16} m/cycle — prediction
$\lambda_{\tau\_}$ = 1.110538(75) × 10^{-16} m/cycle — CODATA 2022, $\sigma = -0.03$
$\lambda_{\tau\_}$ = 1.110538(75) × 10^{-16} m/cycle — CODATA 2018, $\sigma = -0.03$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

Wien frequency displacement law constant 42.04047(85)

$$b' = \frac{1}{2\pi}\left(\frac{\nu_{\text{peak}}}{t_p\, T_p}\right)\left(1 + 18\left(\frac{2\pi}{4s}\right)^2 \left(ж_1{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

Where ν_{peak} = the peak emission of spectral flux per unit frequency, π = Archimedes' constant, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$b' = 5.878925757 96309 \ldots \times 10^{10}$ Hz/K prediction
$b' = 5.878925757 \times 10^{10}$ Hz/K CODATA 2022, 10-digit match
$b' = 5.878925757 \times 10^{10}$ Hz/K CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

$\nu_{\text{peak}} = 2.82143937212207 \ldots$ is the solution to the equation $\frac{x\, e^x}{e^x - 1} = 3$.

Boltzmann constant in Hz/K 42.0407(24)

$$\ddot{k}_B = \frac{1}{2\pi}\left(\frac{1}{t_p\, T_p}\right)\left(1 + 18\left(\frac{2\pi}{4s}\right)^2 \left(ж_1{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

Where π = Archimedes' constant, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\ddot{k}_B = 2.083661912 44486 \ldots \times 10^{10}$ Hz/K prediction
$\ddot{k}_B = 2.083661912 \times 10^{10}$ Hz/K CODATA 2022, 10-digit match
$\ddot{k}_B = 2.083661912 \times 10^{10}$ Hz/K CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

kelvin-hertz relationship 42.0414(24)

$$\mathrm{K} : \mathrm{Hz} = \frac{1}{2\pi}\left(\frac{\mathrm{K}}{t_p\, T_p}\right)\left(1 + 18\left(\frac{2\pi}{4s}\right)^2 \left(ж_1{}^2 - ж_3{}^2 - ж_4{}^2\right) \boxtimes\right)$$

Where π = Archimedes' constant, K = the kelvin, t_p = the Planck time, T_p = the Planck temperature, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{K} : \mathrm{Hz} = 2.083661912\mathbf{44486} \ldots \times 10^{10}$ Hz prediction
$\mathrm{K} : \mathrm{Hz} = 2.083661912 \times 10^{10}$ Hz CODATA 2022, 10-digit match
$\mathrm{K} : \mathrm{Hz} = 2.083661912 \times 10^{10}$ Hz CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

hertz-kelvin relationship -42.0414(24)

$$\mathrm{Hz} : \mathrm{K} = 2\pi\left(\frac{t_p\, T_p}{\mathrm{s}}\right)\left(1 - 18\left(\frac{2\pi}{4s}\right)^2 \left(ж_1{}^2 - ж_3{}^2 - ж_4{}^2\right) \boxtimes\right)$$

Where π = Archimedes' constant, t_p = the Planck time, T_p = the Planck temperature, s = the second, s = the arc length of the unit lemniscate, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{Hz} : \mathrm{K} = 4.799243073\mathbf{02320} \ldots \times 10^{-11}$ K prediction
$\mathrm{Hz} : \mathrm{K} = 4.799243073 \times 10^{-11}$ K CODATA 2022, 10-digit match
$\mathrm{Hz} : \mathrm{K} = 4.799243073 \times 10^{-11}$ K CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

Wien wavelength displacement law constant -45.6561(28)

$$b = 2\pi\left(\frac{l_p\,T_p}{\lambda_{\text{peak}}}\right)\left(\,1 + P^2\,(\,ж_1{}^2 + ж_3{}^2 + ж_4{}^2\,)\,⊠\,\right)$$

Where π = Archimedes' constant, λ_{peak} = the peak wavelength of spectral radiance per unit wavelength, l_p = the Planck length, T_p = the Planck temperature, P = the plastic constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$b = 2.89777195379426\ldots \times 10^{-3}$ m · K/cycle — prediction
$b = 2.897771955 \times 10^{-3}$ m · K/cycle — CODATA 2022, 9-digit match
$b = 2.897771955 \times 10^{-3}$ m · K/cycle — CODATA 2018, 9-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

$\lambda_{\text{peak}} = 4.96511423174427\ldots$ is the solution to the equation $\frac{x\,e^x}{e^x - 1} = \mathbf{5}$.

second radiation constant -45.6561(28)

$$c_2 = 2\pi\,(\,l_p\,T_p\,)\left(\,1 + P^2\,(\,ж_1{}^2 + ж_3{}^2 + ж_4{}^2\,)\,⊠\,\right)$$

Where π = Archimedes' constant, l_p = the Planck length, T_p = the Planck temperature, P = the plastic constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$c_2 = 1.43877687681333\ldots \times 10^{-2}$ m · K — prediction
$c_2 = 1.438776877 \times 10^{-2}$ m · K — CODATA 2022, 10-digit match
$c_2 = 1.438776877 \times 10^{-2}$ m · K — CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

inverse meter-kelvin relationship -45.6543(35)

$$\frac{1}{\mathrm{m}} : \mathrm{K} = 2\pi \left(\frac{l_p\, T_p}{\mathrm{m}} \right) \left(1 + P^2 \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where π = Archimedes' constant, l_p = the Planck length, T_p = the Planck temperature, m = the meter, P = the plastic constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$1/\mathrm{m} : \mathrm{K} = 1.43877687681333 \ldots \times 10^{-2}$ K prediction
$1/\mathrm{m} : \mathrm{K} = 1.438776877 \times 10^{-2}$ K CODATA 2022, 10-digit match
$1/\mathrm{m} : \mathrm{K} = 1.438776877 \times 10^{-2}$ K CODATA 2018, 10-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

kelvin-inverse meter relationship 45.6543(35)

$$\mathrm{K} : \frac{1}{\mathrm{m}} = \frac{1}{2\pi} \left(\frac{\mathrm{K}}{l_p\, T_p} \right) \left(1 - P^2 \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where π = Archimedes' constant, K = the kelvin, l_p = the Planck length, T_p = the Planck temperature, P = the plastic constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{K} : 1/\mathrm{m} = 6.95034800805251 \ldots \times 10^{1}$ cycles/m prediction
$\mathrm{K} : 1/\mathrm{m} = 6.950348004 \times 10^{1}$ cycles/m CODATA 2022, 9.23-digit match
$\mathrm{K} : 1/\mathrm{m} = 6.950348004 \times 10^{1}$ cycles/m CODATA 2018, 9.23-digit match
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +0.00$

Boltzmann constant in inverse meter per kelvin 45.65224(72)

$$\dot{k_B} = \frac{1}{2\pi}\left(\frac{1}{l_p\, T_p}\right)\left(1 - P^2\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where π = Archimedes' constant, l_p = the Planck length, T_p = the Planck temperature, K_{-6} = the Khinchin mean of order -6, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\dot{k_B} = 6.950348000805251 \ldots \times 10^1$ cycles/m · K — prediction

$\dot{k_B} = 6.950348004 \times 10^1$ cycles/m · K — CODATA 2022, 9.23-digit match

$\dot{k_B} = 6.950348004 \times 10^1$ cycles/m · K — CODATA 2018, 9.23-digit match

$\Delta_{\text{precision}} = +0.00$

$\Delta_{\text{scaled}} = +0.00$

hartree-kelvin relationship -54.431024(11)

$$E_h \vdots \mathrm{K} = ж_1{}^4 \left(\frac{T_p\, m_e}{m_p} \right) \left(1 + \frac{s}{\sqrt{2\pi}} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, T_p = the Planck temperature, m_e = the electron mass, m_p = the Planck mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$E_h \vdots \mathrm{K} = 3.15775024803817 \ldots \times 10^5\ \mathrm{K}$ prediction
$E_h \vdots \mathrm{K} = 3.1577502480398(34) \times 10^5\ \mathrm{K}$ CODATA 2022, $\sigma = -0.48$
$E_h \vdots \mathrm{K} = 3.1577502480407(61) \times 10^5\ \mathrm{K}$ CODATA 2018, $\sigma = -0.41$
$\Delta_{\text{precision}} = +0.25$
$\Delta_{\text{scaled}} = -0.15$

kelvin-hartree relationship 54.431320(11)

$$\mathrm{K} \vdots E_h = \frac{1}{ж_1{}^4} \left(\frac{\mathrm{K}\, m_p}{T_p\, m_e} \right) \left(1 + \frac{s}{\sqrt{2\pi}} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)^{-1}$$

Where $ж_1$ = the 1st hyperbolic partition constant, K = the kelvin, m_p = the Planck mass, T_p = the Planck temperature, m_e = the electron mass, s = the arc length of the unit lemniscate, π = Archimedes' constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{K} \vdots E_h = 3.16681156345811 \ldots \times 10^{-6}\ E_h$ prediction
$\mathrm{K} \vdots E_h = 3.1668115634564(35) \times 10^{-6}\ E_h$ CODATA 2022, $\sigma = +0.50$
$\mathrm{K} \vdots E_h = 3.1668115634556(61) \times 10^{-6}\ E_h$ CODATA 2018, $\sigma = +0.41$
$\Delta_{\text{precision}} = +0.24$
$\Delta_{\text{scaled}} = +0.13$

electron molar mass -283.54(31)

$$M_e = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{\mathrm{C\,kg}\,m_e}{q_p\,m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_e = the electron mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$M_e = 5.48579909796588\ldots \times 10^{-7}$ kg/mol prediction
$M_e = 5.4857990962(17) \times 10^{-7}$ kg/mol CODATA 2022, $\sigma = +1.04$
$M_e = 5.4857990888(17) \times 10^{-7}$ kg/mol CODATA 2018, $\sigma = +5.39$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +4.35$

muon molar mass -283.50(22)

$$M_\mu = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{\mathrm{C\,kg}\,m_\mu}{q_p\,m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_μ = the muon mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$M_\mu = 1.13428925199289\ldots \times 10^{-4}$ kg/mol prediction
$M_\mu = 1.134289258(25) \times 10^{-4}$ kg/mol CODATA 2022, $\sigma = -0.24$
$M_\mu = 1.134289259(25) \times 10^{-4}$ kg/mol CODATA 2018, $\sigma = -0.28$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -0.04$

molar mass constant -283.5449(30)

$$M_{A_{\text{mass}}} = \frac{6}{e^{\gamma}} ж_1{}^2 \left(\frac{\text{C kg A}_{\text{mass}}}{q_p\, m_p} \right) \left(1 + 18\, C_{\text{Q}} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, A_{mass} = the atomic mass constant, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$M_{A_{\text{mass}}} = 1.0000000036176\ldots \times 10^{-3}$ kg/mol prediction
$M_{A_{\text{mass}}} = 1.00000000105(31) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = +1.01$
$M_{A_{\text{mass}}} = 0.99999999965(30) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +5.71$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.67$

proton molar mass -283.5447(30)

$$M_{+} = \frac{6}{e^{\gamma}} ж_1{}^2 \left(\frac{\text{C kg}\, m_{+}}{q_p\, m_p} \right) \left(1 + 18\, C_{\text{Q}} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_{+} = the proton mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$M_{+} = 1.0072764679539 6\ldots \times 10^{-3}$ kg/mol prediction
$M_{+} = 1.00727646764(31) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = +1.01$
$M_{+} = 1.00727646627(31) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +5.43$
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +4.42$

neutron molar mass -283.5457(57)

$$\mathrm{M}_n = \frac{6}{e^{\gamma}}\,ж_1{}^2 \left(\frac{\mathrm{C\,kg}\, m_n}{q_p\, m_p} \right) \left(1 + 18\, C_\mathrm{Q} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_n = the neutron mass, q_p = the Planck charge, m_p = the Planck mass, C_Q = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{M}_n = 1.00866491684647 \ldots \times 10^{-3}$ kg/mol prediction
$\mathrm{M}_n = 1.00866491712(51) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = -0.54$
$\mathrm{M}_n = 1.00866491560(57) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +2.19$
$\Delta_\text{precision} = +0.05$
$\Delta_\text{scaled} = +2.67$

tau molar mass -287.(680)

$$\mathrm{M}_\tau = \frac{6}{e^{\gamma}}\,ж_1{}^2 \left(\frac{\mathrm{C\,kg}\, m_\tau}{q_p\, m_p} \right) \left(1 + 18\, C_\mathrm{Q} \left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_τ = the tau mass, q_p = the Planck charge, m_p = the Planck mass, C_Q = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{M}_\tau = 1.90754046781407 \ldots \times 10^{-3}$ kg/mol prediction
$\mathrm{M}_\tau = 1.90754(13) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = +0.00$
$\mathrm{M}_\tau = 1.90754(13) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +0.00$
$\Delta_\text{precision} = +0.00$
$\Delta_\text{scaled} = +0.00$

deuteron molar mass -283.5443(31)

$$\mathrm{M_{de}} = \frac{6}{e^{\gamma}}\,ж_1{}^2 \left(\frac{\mathrm{C\,kg}\,m_{\mathrm{de}}}{q_p\,m_p} \right) \left(1 + 18\,C_{\mathrm{Q}}\,\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_{de} = the deuteron mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{M_{de}} = 2.01355321529080\ldots \times 10^{-3}$ kg/mol	prediction
$\mathrm{M_{de}} = 2.01355321466(63) \times 10^{-3}$ kg/mol	CODATA 2022, $\sigma = +1.00$
$\mathrm{M_{de}} = 2.01355321205(61) \times 10^{-3}$ kg/mol	CODATA 2018, $\sigma = +5.31$
	$\Delta_{\mathrm{precision}} = -0.01$
	$\Delta_{\mathrm{scaled}} = +4.28$

helion molar mass -283.5447(30)

$$\mathrm{M_{he}} = \frac{6}{e^{\gamma}}\,ж_1{}^2 \left(\frac{\mathrm{C\,kg}\,m_{\mathrm{he}}}{q_p\,m_p} \right) \left(1 + 18\,C_{\mathrm{Q}}\,\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2 \right) ⊠ \right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_{he} = the helion mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{M_{he}} = 3.01493225103642\ldots \times 10^{-3}$ kg/mol	prediction
$\mathrm{M_{he}} = 3.01493225010(94) \times 10^{-3}$ kg/mol	CODATA 2022, $\sigma = +1.00$
$\mathrm{M_{he}} = 3.01493224613(91) \times 10^{-3}$ kg/mol	CODATA 2018, $\sigma = +5.39$
	$\Delta_{\mathrm{precision}} = -0.01$
	$\Delta_{\mathrm{scaled}} = +4.36$

triton molar mass -283.5439(30)

$$\mathrm{M_{tri}} = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{\mathrm{C\,kg}\,m_{\mathrm{tri}}}{q_p\,m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_{tri} = the triton mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{M_{tri}} = 3.01550071982806\ldots \times 10^{-3}$ kg/mol prediction
$\mathrm{M_{tri}} = 3.01550071913(94) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = +0.74$
$\mathrm{M_{tri}} = 3.01550071517(92) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +5.06$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = +4.30$

alpha particle molar mass -283.5454(30)

$$\mathrm{M}_{\alpha} = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{\mathrm{C\,kg}\,m_{\alpha}}{q_p\,m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, m_{α} = the alpha particle mass, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\mathrm{M}_{\alpha} = 4.00150618457836\ldots \times 10^{-3}$ kg/mol prediction
$\mathrm{M}_{\alpha} = 4.0015061833(12) \times 10^{-3}$ kg/mol CODATA 2022, $\sigma = +1.07$
$\mathrm{M}_{\alpha} = 4.0015061777(12) \times 10^{-3}$ kg/mol CODATA 2018, $\sigma = +5.73$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = +4.67$

molar mass of carbon-12 -283.544(33)

$$M_{^{12}\mathrm{C}} = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{12\ \mathrm{C\ kg\ A_{mass}}}{q_p\ m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, $\mathrm{A_{mass}}$ = the atomic mass constant, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$M_{^{12}\mathrm{C}} = 1.2000000163412\ldots \times 10^{-2}$ kg/mol prediction

$M_{^{12}\mathrm{C}} = 1.20000000126(36) \times 10^{-2}$ kg/mol CODATA 2022, $\sigma = +1.04$

$M_{^{12}\mathrm{C}} = 1.19999999958(36) \times 10^{-2}$ kg/mol CODATA 2018, $\sigma = +5.71$

$\Delta_{\mathrm{precision}} = +0.00$

$\Delta_{\mathrm{scaled}} = +4.67$

Avogadro constant -283.5364(83)

$$N_A = \frac{6}{e^{\gamma}}\,ж_1{}^2\left(\frac{\mathrm{C\ kg}}{q_p\ m_p}\right)\left(1 + 18\,C_{\mathrm{Q}}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where e = Euler's number, γ = the Euler-Mascheroni constant, $ж_1$ = the 1st hyperbolic partition constant, C = the coulomb, kg = the kilogram, q_p = the Planck charge, m_p = the Planck mass, C_{Q} = the QRS constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$N_A = 6.02214076443131\ldots \times 10^{23}$ 1/mol prediction

$N_A = 6.02214076 \times 10^{23}$ 1/mol CODATA 2022, 9.13-digit match

$N_A = 6.02214076 \times 10^{23}$ 1/mol CODATA 2018, 9.13-digit match

$\Delta_{\mathrm{precision}} = +0.00$

$\Delta_{\mathrm{scaled}} = +0.00$

Sackur-Tetrode constant (1K, 100 kPa) -28.0784(13)

$$ST_0 = \frac{5}{2} + \log\left(\left(\frac{1}{2\pi}\frac{\mathrm{K}\,\mathrm{A_{mass}}}{l_p{}^2\,T_p\,m_p}\right)^{3/2}\frac{\mathrm{K}\,E_p}{T_p\,p_0}\right)\left(1 + j_{0,1}\left(\frac{2\pi}{14}\right)\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

Where $\log(x)$ = the natural logarithm, π = Archimedes' constant, K = kelvin, $\mathrm{A_{mass}}$ = the atomic mass constant, l_p = the Planck length, T_p = the Planck temperature, m_p = the Planck mass, E_p = the Planck energy, p_0 = 100.00000000000 ... kPa, $j_{0,1}$ = the 1st root of the Bessel function, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$ST_0 = -1.15170753432430\ldots$ prediction
$ST_0 = -1.15170753496(47)$ CODATA 2022, $\sigma = +1.35$
$ST_0 = -1.15170753706(45)$ CODATA 2018, $\sigma = -6.08$
$\Delta_{\text{precision}} = -0.02$
$\Delta_{\text{scaled}} = -4.66$

The Planck energy is equal to the product of the Planck length squared and the Planck mass, divided by the Planck time squared,

$$E_p = \frac{l_p{}^2\,m_p}{t_p{}^2}.$$

Sackur-Tetrode constant (1K, 101.325 kPa) -27.9776(13)

$$ST_1 = \frac{5}{2} + \log\left(\left(\frac{1}{2\pi}\frac{\mathrm{K}\,\mathrm{A_{mass}}}{l_p{}^2\,T_p\,m_p}\right)^{3/2}\frac{\mathrm{K}\,E_p}{T_p\,p_1}\right)\left(1+\frac{1}{G_{Ga}}\left(\frac{4\pi}{14}\right)\left(ж_1{}^2+ж_3{}^2+ж_4{}^2\right)\boxtimes\right)$$

Where $\log(x)$ = the natural logarithm, π = Archimedes' constant, $\mathrm{A_{mass}}$ = the atomic mass constant, K = kelvin, l_p = the Planck length, m_p = the Planck mass, T_p = the Planck temperature, E_p = the Planck energy, p_1 = 101.325000000000 kPa, G_{Ga} = Gauss's constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$ST_1 = -1.16487052045596\ldots$ prediction
$ST_1 = -1.16487052149(47)$ CODATA 2022, $\sigma = +2.20$
$ST_1 = -1.16487052358(45)$ CODATA 2018, $\sigma = -6.94$
$\Delta_{\mathrm{precision}} = -0.02$
$\Delta_{\mathrm{scaled}} = -4.64$

The Planck energy is equal to the product of the Planck length squared and the Planck mass, divided by the Planck time squared,

$$E_p = \frac{l_p{}^2\,m_p}{t_p{}^2}.$$

Stefan-Boltzmann constant 180.53565(88)

$$\sigma = \frac{3}{\mathbf{5}} \left(\frac{4\pi}{\Gamma(\mathbf{5})} \right)^2 \left(\frac{m_p}{{t_p}^3 \, {T_p}^4} \right) \left(1 + (18 + 35) \left(\frac{2K}{14} \right) ({ж_1}^2 - {ж_3}^2 - {ж_4}^2) \boxtimes \right)$$

Where π = Archimedes' constant, $\Gamma(x)$ = the gamma function, m_p = the Planck mass, t_p = the Planck time, T_p = the Planck temperature, K = Catalan's constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$\sigma = 5.67037441987317 \ldots \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$ prediction
$\sigma = 5.670374419 \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$ CODATA 2022, 10-digit match
$\sigma = 5.670374419 \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$ CODATA 2018, 10-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

conventional value of volt-90 1.066651(50)

$$V_{90} = \text{volt}\left(1 + \frac{L_1}{32}\left(ж_1{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

Where L_1 = the 1st lemniscate constant, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$V_{90} = 1.0000001066\,5218\ldots$ V prediction
$V_{90} = 1.00000010666$ V CODATA 2022, 11.11-digit match
$V_{90} = 1.00000010666$ V CODATA 2018, 11.11-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

conventional value of watt-90 1.955351(50)

$$W_{90} = \text{watt}\left(1 - \frac{j_{0,1}}{32}\left(ж_1{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where $j_{0,1}$ = the 1st root of the Bessel function, $ж_1$ = the 1st hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$W_{90} = 1.0000001955\,2285\ldots$ W prediction
$W_{90} = 1.00000019553$ W CODATA 2022, 11.15-digit match
$W_{90} = 1.00000019553$ W CODATA 2018, 11.15-digit match
$\Delta_{\text{precision}} = +0.00$
$\Delta_{\text{scaled}} = +0.00$

atomic unit of electric field gradient -25.1510(31)

$$A_{ef\,\nabla} = ж_1{}^{7}\left(\frac{m_e{}^3}{t_p{}^2\, q_p\, m_p{}^2}\right)\left(1+\sqrt{35}\left(\frac{V_{fe}}{6}\right)\left(ж_2{}^2+ж_3{}^2+ж_4{}^2\right)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, m_e = the electron mass, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, V_{fe} = the figure eight knot hyperbolic volume, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{ef\,\nabla} = 9.71736242779302\ldots \times 10^{21}\ \mathrm{V/m^2}$ prediction
$A_{ef\,\nabla} = 9.7173624424(30) \times 10^{21}\ \mathrm{V/m^2}$ CODATA 2022, $\sigma = -4.87$
$A_{ef\,\nabla} = 9.7173624292(29) \times 10^{21}\ \mathrm{V/m^2}$ CODATA 2018, $\sigma = -0.49$
$\Delta_{precision} = -0.02$
$\Delta_{scaled} = +4.55$

$$A_{ef\,\nabla} = ж_1{}^{7}\left(\frac{m_e{}^3}{t_p{}^2\, q_p\, m_p{}^2}\right)\left(1-\frac{1}{\sqrt{C_{CFP}}}\left(\frac{4\pi}{18}\right)\left(ж_2{}^2-ж_3{}^2-ж_4{}^2\right)\boxtimes\right)$$

$$A_{ef\,\nabla} = ж_1{}^{7}\left(\frac{m_e{}^3}{t_p{}^2\, q_p\, m_p{}^2}\right)\left(1-\mathcal{S}\left(\frac{2\pi}{32}\right)\left(ж_2{}^2-ж_3{}^2-ж_4{}^2\right)\boxtimes\right)$$

$$A_{ef\,\nabla} = ж_1{}^{7}\left(\frac{m_e{}^3}{t_p{}^2\, q_p\, m_p{}^2}\right)\left(1+\frac{s^2}{35}\left(\frac{32}{4\pi}\right)\left(ж_2{}^2+ж_3{}^2+ж_4{}^2\right)\boxtimes\right)$$

atomic unit of current $-12.016420(11)$

$$A_{\text{current}} = ж_1{}^{5} \left(\frac{q_p\, m_e}{t_p\, m_p} \right) \left(1 - C_{\text{CFP}} \left(\frac{V_{\text{fe}}}{8} \right) \left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2 \right) ⊠ \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, q_p = the Planck charge, m_e = the electron mass, t_p = the Planck time, m_p = the Planck mass, C_{CFP} = the fixed point of the hyperbolic cotangent, V_{fe} = the figure eight knot hyperbolic volume, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{\text{current}} = 6.62361823748092\ldots \times 10^{-3}$ A prediction
$A_{\text{current}} = 6.6236182375082(72) \times 10^{-3}$ A CODATA 2022, $\sigma = -3.79$
$A_{\text{current}} = 6.623618237510(13) \times 10^{-3}$ A CODATA 2018, $\sigma = -2.24$
$\Delta_{\text{precision}} = +0.26$
$\Delta_{\text{scaled}} = -0.15$

atomic unit of magnetic flux density -12.7674(31)

$$A_{\text{mfd}} = ж_1{}^3 \left(\frac{m_e{}^2}{t_p\, q_p\, m_p} \right) \left(1 + \sqrt{8} \left(\frac{4\pi}{35} \right) \left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, m_e = the electron mass, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\text{mfd}} = 2.35051756770603 \ldots \times 10^5$ T prediction
$A_{\text{mfd}} = 2.35051757077(73) \times 10^5$ T CODATA 2022, $\sigma = -4.20$
$A_{\text{mfd}} = 2.35051756758(71) \times 10^5$ T CODATA 2018, $\sigma = +0.18$
$\Delta_{\text{precision}} = -0.01$
$\Delta_{\text{scaled}} = +4.49$

$$A_{\text{mfd}} = ж_1{}^3 \left(\frac{m_e{}^2}{t_p\, q_p\, m_p} \right) \left(1 + G_{\text{Gi}} \left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2 \right) \boxtimes \right)$$

atomic unit of electric dipole moment 9.1408(16)

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 + \frac{P}{L_2}\left(\frac{4\pi}{5!}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, m_e = the electron mass, P = the plastic constant, L_2 = the 2nd lemniscate constant, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\mathrm{edm}} = 8.4783536\mathbf{2016674} \ldots \times 10^{-30}\ \mathrm{m \cdot C}$ prediction
$A_{\mathrm{edm}} = 8.4783536198(13) \times 10^{-30}\ \mathrm{m \cdot C}$ CODATA 2022, $\sigma = +0.28$
$A_{\mathrm{edm}} = 8.4783536255(13) \times 10^{-30}\ \mathrm{m \cdot C}$ CODATA 2018, $\sigma = -4.10$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -4.38$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 + \frac{L_2}{D_{Do}}\left(\frac{4\pi}{!5}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 - \frac{18}{4}\left(\frac{V_{\mathrm{fe}}}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 - \frac{8}{7}\left(\frac{8}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 - \frac{1}{7}\left(\frac{32}{2\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 - \frac{V_{\mathrm{fe}}}{4}\left(\frac{18}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{edm}} = \frac{1}{ж_1}\left(\frac{l_p\, q_p\, m_p}{m_e}\right)\left(1 + 4\left(\frac{V_{\mathrm{fe}}}{35}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

atomic unit of magnetizability 18.2775(62)

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 + L_{LL}\left(\frac{4\pi}{18}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, m_e = the electron mass, L_{LL} = the Laplace limit, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{A_{mag}} = 7.89103656936017\ldots \times 10^{-29}\ \mathrm{J/T^2}$ prediction
$\mathrm{A_{mag}} = 7.8910365794(49) \times 10^{-29}\ \mathrm{J/T^2}$ CODATA 2022, $\sigma = -2.05$
$\mathrm{A_{mag}} = 7.8910366008(48) \times 10^{-29}\ \mathrm{J/T^2}$ CODATA 2018, $\sigma = -6.55$
$\Delta_{\mathrm{precision}} = -0.01$
$\Delta_{\mathrm{scaled}} = -4.45$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 + P\left(\frac{2\pi}{18}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 - \frac{4}{7}\left(\frac{32}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 + \frac{\omega_2}{2}\left(\frac{2\pi}{18}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 + \frac{S}{2}\left(\frac{2\pi}{!5}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 + \frac{1}{\sqrt{35}}\left(\frac{2\pi}{x_\infty}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 - G_{\mathrm{Gi}}\left(\frac{18}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

$$\mathrm{A_{mag}} = \frac{1}{ж_1{}^2}\left(\frac{l_p{}^2\, q_p{}^2\, m_p{}^2}{m_e{}^3}\right)\left(1 - \sqrt{32\, e^{1/e}}\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)⊠\right)$$

atomic unit of electric quadrupole moment 17.9074(31)

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 + \frac{2}{\sqrt{3}}\left(\frac{4\pi}{32}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, l_p = the Planck length, q_p = the Planck charge, m_p = the Planck mass, m_e = the electron mass, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and $\boxtimes$ = the hyperbolic inversion boundary.

$A_{\mathrm{eqm}} = 4.48655151342649\ldots \times 10^{-40}\ \mathrm{m \cdot C}$ prediction
$A_{\mathrm{eqm}} = 4.4865515185(14) \times 10^{-40}\ \mathrm{m \cdot C}$ CODATA 2022, $\sigma = -3.62$
$A_{\mathrm{eqm}} = 4.4865515246(14) \times 10^{-40}\ \mathrm{m \cdot C}$ CODATA 2018, $\sigma = -9.87$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -4.36$

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 + \frac{7}{18}\left(\frac{8K}{2\pi}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 + \frac{\gamma}{2}\left(\frac{4\pi}{8}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 - 7\left(\frac{4K}{18}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 - \frac{12}{j_{0,1}}\left(\frac{4\pi}{!5}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$A_{\mathrm{eqm}} = \frac{1}{ж_1{}^3}\left(\frac{l_p{}^2\, q_p\, m_p{}^2}{m_e{}^2}\right)\left(1 - \frac{2\pi}{\sqrt{3}}\left(\frac{4\pi}{32}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

atomic unit of 1st hyperpolarizability 41.9099(46)

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 - \frac{3}{\sqrt{2}}\left(\frac{4\pi}{8}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right) ⊠\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, l_p = the Planck length, m_e = the electron mass, π = Archimedes' constant, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$A_{1^{st}\,hp} = 3.20636129566261\ldots \times 10^{-53}\ \mathrm{m^3 \cdot C^3 / J^2}$ prediction
$A_{1^{st}\,hp} = 3.2063612996(15) \times 10^{-53}\ \mathrm{m^3 \cdot C^3 / J^2}$ CODATA 2022, $\sigma = -2.62$
$A_{1^{st}\,hp} = 3.2063613061(15) \times 10^{-53}\ \mathrm{m^3 \cdot C^3 / J^2}$ CODATA 2018, $\sigma = -6.96$
$\Delta_{\mathrm{precision}} = +0.00$
$\Delta_{\mathrm{scaled}} = -4.33$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 + \pi\left(\frac{V_{fe}}{6}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 + \frac{D_d}{L_{LL}}\left(\frac{4\pi}{32}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 + \frac{2}{D_{Do}}\left(\frac{4\pi}{32}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 - \sqrt{\frac{7}{5}}\left(\frac{4\pi}{14}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 + \frac{2\pi}{\sqrt{35}}\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

$$A_{1^{st}\,hp} = \frac{1}{ж_1{}^{11}}\left(\frac{t_p{}^4\, q_p{}^3\, m_p{}^3}{l_p\, m_e{}^{5}}\right)\left(1 - D_{Do}\left(\frac{18}{4\pi}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right) ⊠\right)$$

atomic unit of 2nd hyperpolarizability 58.3185(63)

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 - \frac{12}{D_{Do}}\left(\frac{4\pi}{!5}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

Where $ж_1$ = the 1st hyperbolic partition constant, t_p = the Planck time, q_p = the Planck charge, m_p = the Planck mass, l_p = the Planck length, m_e = the electron mass, D_{Do} = the Dottie number, π = Archimedes' constant, $!n$ = the derangement function, $ж_2$ = the 2nd hyperbolic partition constant, $ж_3$ = the 3rd hyperbolic partition constant, $ж_4$ = the 4th hyperbolic partition constant, and ⊠ = the hyperbolic inversion boundary.

$\mathrm{A}_{2\mathrm{nd\ hp}} = 6.2353799 8029131 \ldots \times 10^{-65}\ \mathrm{m}^4 \cdot \mathrm{C}^4 / \mathrm{J}^3$ prediction

$\mathrm{A}_{2\mathrm{nd\ hp}} = 6.2353799735(39) \times 10^{-65}\ \mathrm{m}^4 \cdot \mathrm{C}^4 / \mathrm{J}^3$ CODATA 2022, $\sigma = +1.74$

$\mathrm{A}_{2\mathrm{nd\ hp}} = 6.2353799905(38) \times 10^{-65}\ \mathrm{m}^4 \cdot \mathrm{C}^4 / \mathrm{J}^3$ CODATA 2018, $\sigma = -2.69$

$\Delta_{\mathrm{precision}} = -0.01$

$\Delta_{\mathrm{scaled}} = -4.47$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 - P\left(\frac{!5}{4\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 - \varphi\left(\frac{18}{2\pi}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 + P\left(\frac{14}{4\pi}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 + L_{LL}\left(\frac{14}{2\pi}\right)\left(ж_2{}^2 - ж_3{}^2 - ж_4{}^2\right)\boxtimes\right)$$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 - \frac{16}{j_{0,1}}\left(\frac{4\pi}{18}\right)\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

$$\mathrm{A}_{2\mathrm{nd\ hp}} = \frac{1}{ж_1{}^{16}}\left(\frac{t_p{}^6\, q_p{}^4\, m_p{}^4}{l_p{}^2\, m_e{}^{7}}\right)\left(1 - \frac{18}{8}\left(\frac{2\pi}{s}\right)^4\left(ж_2{}^2 + ж_3{}^2 + ж_4{}^2\right)\boxtimes\right)$$

proton rms charge radius 8.7541(46)

$$\frac{r_n}{r_+} = K = \sum_{n=1}^{\infty} \frac{sin\left(n\,\frac{\pi}{2}\right)}{n^2}$$

Where $K =$ Catalan's constant, $sin(x) =$ the sine function, and $\pi =$ Archimedes' constant.

$r_+ = 8.43431614404474\ldots \times 10^{-16}$ m prediction
$r_+ = 8.4075(64) \times 10^{-16}$ m CODATA 2022, $\sigma = +4.18$
$r_+ = 8.414(19) \times 10^{-16}$ m CODATA 2018, $\sigma = +1.05$
$\Delta_{\text{precision}} = 0.47$
$\Delta_{\text{scaled}} = 0.36$

neutron radius

$$\frac{r_n}{r_e} = \left(\frac{4\pi}{\Gamma(\mathbf{5})}\right)^2 = \sum_{n=1}^{\infty} \frac{cos\left(n\,\frac{\pi}{3}\right)}{n^2}$$

Where $r_e =$ the classical electron radius, $\pi =$ Archimedes' constant, $\Gamma(x) =$ the gamma function, and $cos(x) =$ the cosine function.

$r_n = 7.72554339835845\ldots \times 10^{-16}$ m prediction
$r_n = 8 \times 10^{-16}$ m Povh, B.: Rith, K.: Scholz, C.: Zetsche, F. (2002)

deuteron rms charge radius

$$\frac{r_e}{r_{\text{de}}} = \sqrt{\frac{2\pi}{\log(36)}}$$

Where r_e = the classical electron radius, r_{de} = the deuteron rms charge radius, π = Archimedes' constant, and $\log(x)$ = the natural logarithm.

$r_{\text{de}} = 2.12812292371170 \ldots \times 10^{-15}$ m prediction
$r_{\text{de}} = 2.12778(27) \times 10^{-15}$ m CODATA 2022, $\sigma = +1.26$
$r_{\text{de}} = 2.12799(74) \times 10^{-15}$ m CODATA 2018, $\sigma = +0.18$
$\Delta_{\text{precision}} = 0.44$
$\Delta_{\text{scaled}} = 0.28$

alpha particle rms charge radius

$$\frac{r_n}{r_\alpha} = \sqrt{\frac{C_U}{4}} \qquad C_U = \sqrt{2}\left(\frac{2\pi}{2s}\right)$$

Where r_n = the neutron radius, r_α = the alpha particle rms charge radius, and C_U = the ubiquitous constant, π = Archimedes' constant, and s = the arc length of the unit lemniscate.

$r_\alpha = 1.67865985670315 \ldots \times 10^{-15}$ m prediction
$r_\alpha = 1.6785(21) \times 10^{-15}$ m CODATA 2022, $\sigma = +0.05$
$r_\alpha = 1.6785(21) \times 10^{-15}$ m CODATA 2018, $\sigma = +0.05$
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

fine-structure constant

$$\alpha = ж_1{}^2$$

Where $ж_1$ = the 1st hyperbolic partition constant.

$\alpha = 7.29735257295520\ldots \times 10^{-3}$	prediction
$\alpha = 7.2973525684(14) \times 10^{-3}$	average 11-digit measure, $\sigma = +3.21$
$\alpha = 7.29735256491(80) \times 10^{-3}$	Fan et al. 2023, $\sigma = +10.05$
$\alpha = 7.2973525643(11) \times 10^{-3}$	CODATA 2022, $\sigma = +7.82$
$\alpha = 7.2973525628(06) \times 10^{-3}$	Morel et al. 2020, $\sigma = +16.83$
$\alpha = 7.2973525693(11) \times 10^{-3}$	CODATA 2018, $\sigma = +3.27$
$\alpha = 7.2973525713(14) \times 10^{-3}$	Parker, Yu, et al. 2018, $\sigma = +1.14$
$\alpha = 7.2973525657(18) \times 10^{-3}$	Aoyama et al. 2017, $\sigma = +4.00$
$\alpha = 7.2973525664(17) \times 10^{-3}$	CODATA 2014, $\sigma = +3.82$
$\alpha = 7.2973525717(48) \times 10^{-3}$	Bouchendira 2010, $\sigma = +0.25$
$\alpha = 7.2973525698(24) \times 10^{-3}$	CODATA 2010, $\sigma = +1.29$
$\alpha = 7.2973525692(27) \times 10^{-3}$	Gabrielse, Hanneke 2008, $\sigma = +1.37$
$\alpha = 7.2973525700(52) \times 10^{-3}$	Gabrielse 2007, $\sigma = +0.56$
$\alpha = 7.2973525376(50) \times 10^{-3}$	CODATA 2006, $\sigma = +7.06$
$\alpha = 7.297352568(24) \times 10^{-3}$	CODATA 2002, $\sigma = +2.04$
$\alpha = 7.297352533(27) \times 10^{-3}$	CODATA 1998, $\sigma = +1.44$
$\alpha = 7.297352582(27) \times 10^{-3}$	Kinoshita 1998, $\sigma = -0.37$
$\alpha = 7.29735308(33) \times 10^{-3}$	CODATA 1986, $\sigma = -1.55$
$\alpha = 7.2973461(81) \times 10^{-3}$	CODATA 1973, $\sigma = +0.79$
$\alpha = 7.297351(11) \times 10^{-3}$	CODATA 1969, $\sigma = +0.09$

* Note Fan et al. 2023 is not an experimentally measured value. It is a value determined by *current theory* based on an experimentally determined value of the *electron magnetic moment*.

** CODATA values are computed by averaging other measurements; they are not independent experiments.

electron charge

$$e = ж_1 q_p$$

Where $ж_1$ = the 1st hyperbolic partition constant, and q_p = the Planck charge.

$e = 1.602176577405973 \ldots \times 10^{-19}\ C$ prediction
$e = 1.602176634 \times 10^{-19}\ C$ CODATA 2022, 8-digit match
$e = 1.602176634 \times 10^{-19}\ C$ CODATA 2018, 8-digit match
$e = 1.602176565(35) \times 10^{-19}\ C$ CODATA 2010, $\sigma = +0.26$
$\Delta_{\text{precision}} = 0.00$
$\Delta_{\text{scaled}} = 0.00$

Also known as the *elementary charge,* and the *atomic unit of charge*.

W to Z mass ratio

$$\frac{m_W}{m_Z} = \log(\ 1 + \sqrt{2}\ )$$

Where m_W = the W boson mass, m_Z = the Z boson mass, and $\log(x)$ = the natural logarithm.

$m_W/m_Z = 0.881373587019543\ldots$	prediction
$m_W/m_Z = 0.88145(13)$	CODATA 2022, $\sigma = -0.62$
$m_W/m_Z = 0.88153(17)$	CODATA 2018, $\sigma = -0.94$
	$\Delta_{\text{precision}} = 0.12$
	$\Delta_{\text{scaled}} = 0.47$

$$\log(\ 1 + \sqrt{2}\ ) = P_{up} - \sqrt{2}$$

$$\frac{m_W}{m_Z} + \sqrt{2} = P_{up}$$

weak mixing angle

$$\frac{m_W}{m_Z} = cos(\theta_W) \qquad 1 - \left(\frac{m_W}{m_Z}\right)^2 = sin^2(\theta_W)$$

Where $cos(x)$ = the cosine function, $sin(x)$ = the sine function, m_W = the mass of the W boson, and m_Z = the mass of the Z boson.

$sin^2(\theta_W) = 0.223180600010430\ldots$	prediction
$sin^2(\theta_W) = 0.22305(23)$	CODATA 2022, $\sigma = +0.57$
$sin^2(\theta_W) = 0.22290(30)$	CODATA 2018, $\sigma = +0.93$
	$\Delta_{\text{precision}} = 0.12$
	$\Delta_{\text{scaled}} = 0.50$

End of Transform Dictionary