Fundamental Physical Constants

Quantity	Symbol	Value	Unit	Relative uncertainty (ppm)
FREQUENTLY USED CONSTANTS				
speed of light in vacuum	c	299 792 458	$\mathrm{m\ s^{-1}}$	(exact)
permeability of vacuum	μ_0	$4\pi \times 10^{-7}$	$\mathrm{N\ A^{-2}}$	
		$=12.566\,370\,614...$	$10^{-7}\ \mathrm{N\ A^{-2}}$	(exact)
permittivity of vacuum $1/\mu_0 c^2$	ε_0	8.854 187 817...	$10^{-12}\ \mathrm{F\ m^{-1}}$	(exact)
Newtonian constant of gravitation	G	6.672 59(85)	$10^{-11}\ \mathrm{m^3\ kg^{-1}\ s^{-2}}$	128.
Planck constant	h	6.626 075 5(40)	$10^{-34}\ \mathrm{J\ s}$	0.60
$h/2\pi$	$\hbar$	1.054 572 66(63)	$10^{-34}\ \mathrm{J\ s}$	0.60
elementary charge	e	1.602 177 33(49)	$10^{-19}\ \mathrm{C}$	0.30
magnetic flux quantum $h/2e$	Φ_0	2.067 834 61(61)	$10^{-15}\ \mathrm{Wb}$	0.30
electron mass	m_e	9.109 389 7(54)	$10^{-31}\ \mathrm{kg}$	0.59
proton mass	m_p	1.672 623 1(10)	$10^{-27}\ \mathrm{kg}$	0.59
proton-electron mass ratio	m_p/m_e	1 836.152 701(37)		0.020
fine-structure constant $\mu_0 c e^2/2h$	α	7.297 353 08(33)	10^{-3}	0.045
inverse fine-structure constant	α^{-1}	137.035 989 5(61)		0.045
Rydberg constant $m_e c\alpha^2/2h$	R_∞	10 973 731.534(13)	$\mathrm{m^{-1}}$	0.0012
Avogadro constant	N_A, L	6.022 136 7(36)	$10^{23}\ \mathrm{mol^{-1}}$	0.59
Faraday constant $N_A e$	F	96 485.309(29)	$\mathrm{C\ mol^{-1}}$	0.30
molar gas constant	R	8.314 510(70)	$\mathrm{J\ mol^{-1}\ K^{-1}}$	8.4
Boltzmann constant R/N_A	k	1.380 658(12)	$10^{-23}\ \mathrm{J\ K^{-1}}$	8.5
Stefan-Boltzmann constant $(\pi^2/60)k^4/\hbar^3 c^2$	σ	5.670 51(19)	$10^{-8}\ \mathrm{W\ m^{-2}\ K^{-4}}$	34.
UNIVERSAL CONSTANTS				
speed of light in vacuum	c	299 792 458	$\mathrm{m\ s^{-1}}$	(exact)
permeability of vacuum	μ_0	$4\pi \times 10^{-7}$	$\mathrm{N\ A^{-2}}$	
		$= 12.566\,370\,614...$	$10^{-7}\ \mathrm{N\ A^{-2}}$	(exact)
permittivity of vacuum $1/\mu_0 c^2$	ε_0	8.854 187 817...	$10^{-12}\ \mathrm{F\ m^{-1}}$	(exact)
Newtonian constant of gravitation	G	6.672 59(85)	$10^{-11}\ \mathrm{m^3\ kg^{-1}\ s^{-2}}$	128.
Planck constant	h	6.626 075 5(40)	$10^{-34}\ \mathrm{J\ s}$	0.60
in electron volts: $h/\{e\}$		4.135 669 2(12)	$10^{-15}\ \mathrm{eV\ s}$	0.30
$h/2\pi$	$\hbar$	1.054 572 66(63)	$10^{-34}\ \mathrm{J\ s}$	0.60
in electron volts: $\hbar/\{e\}$		6.582 122 0(20)	$10^{-16}\ \mathrm{eV\ s}$	0.30
Planck mass $(\hbar c/G)^{1/2}$	m_P	2.176 71(14)	$10^{-8}\ \mathrm{kg}$	64.
Planck length $\hbar/m_P c = (\hbar G/c^3)^{1/2}$	l_P	1.616 05(10)	$10^{-35}\ \mathrm{m}$	64.
Planck time $l_P/c = (\hbar G/c^5)^{1/2}$	t_P	5.390 56(34)	$10^{-44}\ \mathrm{s}$	64.

ELECTROMAGNETIC CONSTANTS

elementary charge	e	1.602 177 33(49)	10^{-19} C	0.30
	e/h	2.417 988 36(72)	10^{14} A J^{-1}	0.30
magnetic flux quantum $h/2e$	Φ_0	2.067 834 61(61)	10^{-15} Wb	0.30
Josephson frequency-voltage quotient	$2e/h$	4.835 976 7(14)	10^{14} Hz V^{-1}	0.30
quantized Hall conductance	e^2/h	3.874 046 14(17)	10^{-5} S	0.045
quantized Hall resistance $h/e^2 = \mu_0 c/2\alpha$	R_H	25 812.805 6(12)	Ω	0.045
Bohr magneton $e\hbar/2m_e$	μ_B	9.274 015 4(31)	10^{-24} J T^{-1}	0.34

Electron

electron mass	m_e	9.109 389 7(54)	10^{-31} kg	0.59
		5.485 799 03(13)	10^{-4} u	0.023
in electron volts: $m_e c^2/\{e\}$		0.510 999 06(15)	MeV	0.30
electron-muon mass ratio	m_e/m_μ	4.836 332 18(71)	10^{-3}	0.15
electron-proton mass ratio	m_e/m_p	5.446 170 13(11)	10^{-4}	0.020
electron-deuteron mass ratio	m_e/m_d	2.724 437 07(6)	10^{-4}	0.020
electron-α-particle mass ratio	m_e/m_α	1.370 933 54(3)	10^{-4}	0.021
electron specific charge	$-e/m_e$	–1.758 819 62(53)	10^{11} C kg^{-1}	0.30
electron molar mass	$M(e)$, M_e	5.485 799 03(13)	10^{-7} kg/mol	0.023
Compton wavelength $h/m_e c$	λ_C	2.426 310 58(22)	10^{-12} m	0.089
$\lambda_C/2\pi = \alpha a_o = \alpha^2/4\pi R_\infty$	λ_C	3.861 593 23(35)	10^{-13} m	0.089
classical electron radius $\alpha^2 a_o$	r_e	2.817 940 92(38)	10^{-15} m	0.13
Thomson cross section $(8\pi/3)r_e^2$	σ_e	0.665 246 16(18)	10^{-28} m^2	0.27
electron magnetic moment	μ_e	928.477 01(31)	10^{-26} J T^{-1}	0.34
in Bohr magnetons	μ_e/μ_B	1.001 159 652 193(10)		
in nuclear magnetons	μ_e/μ_N	1 838.282 000(37)		0.020
electron magnetic moment anomaly $\mu_e/\mu_B - 1$	a_e	1.159 652 193(10)	10^{-3}	0.0086
electron g-factor $2(1+a_e)$	g_e	2.002 319 304 386(20)		
electron-muon magnetic moment ratio	μ_e/μ_μ	206.766 967(30)		0.15
electron-proton magnetic moment ratio	μ_e/μ_p	658.210 688 1(66)		0.010