Fundamental Physical Constants — Atomic and nuclear constants

Quantity	Symbol	Value	Unit	Relative std. uncert. $u_{\rm r}$
		General		
fine-structure constant $e^2/4\pi\epsilon_0\hbar c$	α	$7.297\,352\,5643(11)\times 10^{-3}$		1.6×10^{-10}
inverse fine-structure constant	α^{-1}	$137.035\,999\,177(21)$		1.6×10^{-10}
Rydberg frequency $\alpha^2 m_{\rm e}c^2/2h = E_{\rm h}/2h$	cR_∞	$3.289\,841\,960\,2500(36)\times 10^{15}$	Hz	1.1×10^{-12}
energy equivalent	$hc\,R_\infty$	$2.179\,872\,361\,1030(24)\times 10^{-18}$	J	1.1×10^{-12}
		$13.605\,693\,122\,990(15)$	eV	1.1×10^{-12}
Rydberg constant	R_∞	$10\,973\,731.568\,157(12)$	[m^{-1}]*	1.1×10^{-12}
Bohr radius $\hbar/\alpha m_{\rm e}c = 4\pi\epsilon_0\hbar^2/m_{\rm e}e^2$	a_0	$5.291\,772\,105\,44(82)\times 10^{-11}$	m	1.6×10^{-10}
Hartree energy $\alpha^2 m_{\rm e}c^2 = e^2/4\pi\epsilon_0 a_0 = 2hcR_\infty$	$E_{\rm h}$	$4.359\,744\,722\,2060(48)\times 10^{-18}$	J	1.1×10^{-12}
		$27.211\,386\,245\,981(30)$	eV	1.1×10^{-12}
quantum of circulation	$\pi\hbar/m_{\rm e}$	$3.636\,947\,5467(11)\times 10^{-4}$	m^2 s^{-1}	3.1×10^{-10}
	$2\pi\hbar/m_{\rm e}$	$7.273\,895\,0934(23)\times 10^{-4}$	m^2 s^{-1}	3.1×10^{-10}
		Electroweak		
Fermi coupling constant†	$G_{\rm F}/(\hbar c)^3$	$1.166\,3787(6)\times 10^{-5}$	GeV^{-2}	5.1×10^{-7}
weak mixing angle‡ $\theta_{\rm W}$ (on-shell scheme)				
$\sin^2\theta_{\rm W} = s^2_{\rm W} \equiv 1-(m_{\rm W}/m_{\rm Z})^2$	$\sin^2\theta_{\rm W}$	$0.223\,05(23)$		1.0×10^{-3}
		Electron, e$^-$		
electron mass	$m_{\rm e}$	$9.109\,383\,7139(28)\times 10^{-31}$	kg	3.1×10^{-10}
		$5.485\,799\,090\,441(97)\times 10^{-4}$	u	1.8×10^{-11}
energy equivalent	$m_{\rm e}c^2$	$8.187\,105\,7880(26)\times 10^{-14}$	J	3.1×10^{-10}
		$0.510\,998\,950\,69(16)$	MeV	3.1×10^{-10}
electron-muon mass ratio	$m_{\rm e}/m_\mu$	$4.836\,331\,70(11)\times 10^{-3}$		2.2×10^{-8}
electron-tau mass ratio	$m_{\rm e}/m_\tau$	$2.875\,85(19)\times 10^{-4}$		6.8×10^{-5}
electron-proton mass ratio	$m_{\rm e}/m_{\rm p}$	$5.446\,170\,214\,889(94)\times 10^{-4}$		1.7×10^{-11}
electron-neutron mass ratio	$m_{\rm e}/m_{\rm n}$	$5.438\,673\,4416(22)\times 10^{-4}$		4.0×10^{-10}
electron-deuteron mass ratio	$m_{\rm e}/m_{\rm d}$	$2.724\,437\,107\,629(47)\times 10^{-4}$		1.7×10^{-11}
electron-triton mass ratio	$m_{\rm e}/m_{\rm t}$	$1.819\,200\,062\,327(68)\times 10^{-4}$		3.8×10^{-11}
electron-helion mass ratio	$m_{\rm e}/m_{\rm h}$	$1.819\,543\,074\,649(53)\times 10^{-4}$		2.9×10^{-11}
electron to alpha particle mass ratio	$m_{\rm e}/m_\alpha$	$1.370\,933\,554\,733(32)\times 10^{-4}$		2.4×10^{-11}
electron charge to mass quotient	$-e/m_{\rm e}$	$-1.758\,820\,008\,38(55)\times 10^{11}$	C kg^{-1}	3.1×10^{-10}
electron molar mass $N_{\rm A}m_{\rm e}$	$M({\rm e}), M_{\rm e}$	$5.485\,799\,0962(17)\times 10^{-7}$	kg mol^{-1}	3.1×10^{-10}
reduced Compton wavelength $\hbar/m_{\rm e}c = \alpha a_0$	$\lambda\!\!\!^{-}_{\rm C}$	$3.861\,592\,6744(12)\times 10^{-13}$	m	3.1×10^{-10}
Compton wavelength	$\lambda_{\rm C}$	$2.426\,310\,235\,38(76)\times 10^{-12}$	[m]*	3.1×10^{-10}
classical electron radius $\alpha^2 a_0$	$r_{\rm e}$	$2.817\,940\,3205(13)\times 10^{-15}$	m	4.7×10^{-10}
Thomson cross section $(8\pi/3)r_{\rm e}^2$	$\sigma_{\rm e}$	$6.652\,458\,7051(62)\times 10^{-29}$	m^2	9.3×10^{-10}
electron magnetic moment	$\mu_{\rm e}$	$-9.284\,764\,6917(29)\times 10^{-24}$	J T^{-1}	3.1×10^{-10}
to Bohr magneton ratio	$\mu_{\rm e}/\mu_{\rm B}$	$-1.001\,159\,652\,180\,46(18)$		1.8×10^{-13}
to nuclear magneton ratio	$\mu_{\rm e}/\mu_{\rm N}$	$-1838.281\,971\,877(32)$		1.7×10^{-11}
electron magnetic moment anomaly $\lvert\mu_{\rm e}\rvert/\mu_{\rm B}-1$	$a_{\rm e}$	$1.159\,652\,180\,46(18)\times 10^{-3}$		1.6×10^{-10}
electron g-factor $-2(1+a_{\rm e})$	$g_{\rm e}$	$-2.002\,319\,304\,360\,92(36)$		1.8×10^{-13}
electron-muon magnetic moment ratio	$\mu_{\rm e}/\mu_\mu$	$206.766\,9881(46)$		2.2×10^{-8}
electron-proton magnetic moment ratio	$\mu_{\rm e}/\mu_{\rm p}$	$-658.210\,687\,89(19)$		3.0×10^{-10}
electron to shielded proton magnetic moment ratio (H_2O, sphere, 25 °C)	$\mu_{\rm e}/\mu'_{\rm p}$	$-658.227\,5856(27)$		4.1×10^{-9}

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Quantity	Symbol	Value	Unit	Relative std. uncert. u_r
electron-neutron magnetic moment ratio	μ_e/μ_n	$960.920\,48(23)$		2.4×10^{-7}
electron-deuteron magnetic moment ratio	μ_e/μ_d	$-2143.923\,4921(56)$		2.6×10^{-9}
electron to shielded helion magnetic moment ratio (gas, sphere, 25 °C)	μ_e/μ'_h	$864.058\,239\,86(70)$		8.1×10^{-10}
electron gyromagnetic ratio $2\lvert\mu_e\rvert/\hbar$	γ_e	$1.760\,859\,627\,84(55)\times10^{11}$	$s^{-1}\,T^{-1}$	3.1×10^{-10}
		$28\,024.951\,3861(87)$	MHz T^{-1}	3.1×10^{-10}
		Muon, μ^-		
muon mass	m_μ	$1.883\,531\,627(42)\times10^{-28}$	kg	2.2×10^{-8}
		$0.113\,428\,9257(25)$	u	2.2×10^{-8}
energy equivalent	$m_\mu c^2$	$1.692\,833\,804(38)\times10^{-11}$	J	2.2×10^{-8}
		$105.658\,3755(23)$	MeV	2.2×10^{-8}
muon-electron mass ratio	m_μ/m_e	$206.768\,2827(46)$		2.2×10^{-8}
muon-tau mass ratio	m_μ/m_τ	$5.946\,35(40)\times10^{-2}$		6.8×10^{-5}
muon-proton mass ratio	m_μ/m_p	$0.112\,609\,5262(25)$		2.2×10^{-8}
muon-neutron mass ratio	m_μ/m_n	$0.112\,454\,5168(25)$		2.2×10^{-8}
muon molar mass $N_A m_\mu$	$M(\mu), M_\mu$	$1.134\,289\,258(25)\times10^{-4}$	kg mol^{-1}	2.2×10^{-8}
reduced muon Compton wavelength $\hbar/m_\mu c$	$\lambda\!\!\!^{-}_{C,\mu}$	$1.867\,594\,306(42)\times10^{-15}$	m	2.2×10^{-8}
muon Compton wavelength	$\lambda_{C,\mu}$	$1.173\,444\,110(26)\times10^{-14}$	[m]*	2.2×10^{-8}
muon magnetic moment	μ_μ	$-4.490\,448\,30(10)\times10^{-26}$	J T^{-1}	2.2×10^{-8}
to Bohr magneton ratio	μ_μ/μ_B	$-4.841\,970\,48(11)\times10^{-3}$		2.2×10^{-8}
to nuclear magneton ratio	μ_μ/μ_N	$-8.890\,597\,04(20)$		2.2×10^{-8}
muon magnetic moment anomaly $\lvert\mu_\mu\rvert/(e\hbar/2m_\mu)-1$	a_μ	$1.165\,920\,62(41)\times10^{-3}$		3.5×10^{-7}
muon g-factor $-2(1+a_\mu)$	g_μ	$-2.002\,331\,841\,23(82)$		4.1×10^{-10}
muon-proton magnetic moment ratio	μ_μ/μ_p	$-3.183\,345\,146(71)$		2.2×10^{-8}
		Tau, τ^-		
tau mass[§]	m_τ	$3.167\,54(21)\times10^{-27}$	kg	6.8×10^{-5}
		$1.907\,54(13)$	u	6.8×10^{-5}
energy equivalent	$m_\tau c^2$	$2.846\,84(19)\times10^{-10}$	J	6.8×10^{-5}
		$1776.86(12)$	MeV	6.8×10^{-5}
tau-electron mass ratio	m_τ/m_e	$3477.23(23)$		6.8×10^{-5}
tau-muon mass ratio	m_τ/m_μ	$16.8170(11)$		6.8×10^{-5}
tau-proton mass ratio	m_τ/m_p	$1.893\,76(13)$		6.8×10^{-5}
tau-neutron mass ratio	m_τ/m_n	$1.891\,15(13)$		6.8×10^{-5}
tau molar mass $N_A m_\tau$	$M(\tau), M_\tau$	$1.907\,54(13)\times10^{-3}$	kg mol^{-1}	6.8×10^{-5}
reduced tau Compton wavelength $\hbar/m_\tau c$	$\lambda\!\!\!^{-}_{C,\tau}$	$1.110\,538(75)\times10^{-16}$	m	6.8×10^{-5}
tau Compton wavelength	$\lambda_{C,\tau}$	$6.977\,71(47)\times10^{-16}$	[m]*	6.8×10^{-5}
		Proton, p		
proton mass	m_p	$1.672\,621\,925\,95(52)\times10^{-27}$	kg	3.1×10^{-10}
		$1.007\,276\,466\,5789(83)$	u	8.3×10^{-12}
energy equivalent	$m_p c^2$	$1.503\,277\,618\,02(47)\times10^{-10}$	J	3.1×10^{-10}
		$938.272\,089\,43(29)$	MeV	3.1×10^{-10}
proton-electron mass ratio	m_p/m_e	$1836.152\,673\,426(32)$		1.7×10^{-11}
proton-muon mass ratio	m_p/m_μ	$8.880\,243\,38(20)$		2.2×10^{-8}

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Quantity	Symbol	Value	Unit	Relative std. uncert. u_r
proton-tau mass ratio	m_p/m_τ	$0.528\,051(36)$		6.8×10^{-5}
proton-neutron mass ratio	m_p/m_n	$0.998\,623\,477\,97(40)$		4.0×10^{-10}
proton charge to mass quotient	e/m_p	$9.578\,833\,1430(30)\times10^{7}$	C kg^{-1}	3.1×10^{-10}
proton molar mass $N_A m_p$	M(p), M_p	$1.007\,276\,467\,64(31)\times10^{-3}$	kg mol^{-1}	3.1×10^{-10}
reduced proton Compton wavelength $\hbar/m_p c$	$\lambda\!\!\!^{-}_{C,p}$	$2.103\,089\,100\,51(66)\times10^{-16}$	m	3.1×10^{-10}
proton Compton wavelength	$\lambda_{C,p}$	$1.321\,409\,853\,60(41)\times10^{-15}$	[m]*	3.1×10^{-10}
proton rms charge radius	r_p	$8.4075(64)\times10^{-16}$	m	7.6×10^{-4}
proton magnetic moment	μ_p	$1.410\,606\,795\,45(60)\times10^{-26}$	J T^{-1}	4.3×10^{-10}
to Bohr magneton ratio	μ_p/μ_B	$1.521\,032\,202\,30(45)\times10^{-3}$		3.0×10^{-10}
to nuclear magneton ratio	μ_p/μ_N	$2.792\,847\,344\,63(82)$		2.9×10^{-10}
proton g-factor $2\mu_p/\mu_N$	g_p	$5.585\,694\,6893(16)$		2.9×10^{-10}
proton-neutron magnetic moment ratio	μ_p/μ_n	$-1.459\,898\,02(34)$		2.4×10^{-7}
shielded proton magnetic moment (H_2O, sphere, 25 °C)	μ'_p	$1.410\,570\,5830(58)\times10^{-26}$	J T^{-1}	4.1×10^{-9}
to Bohr magneton ratio	μ'_p/μ_B	$1.520\,993\,1551(62)\times10^{-3}$		4.1×10^{-9}
to nuclear magneton ratio	μ'_p/μ_N	$2.792\,775\,648(11)$		4.1×10^{-9}
proton magnetic shielding correction $1-\mu'_p/\mu_p$ (H_2O, sphere, 25 °C)	σ'_p	$2.567\,15(41)\times10^{-5}$		1.6×10^{-4}
proton gyromagnetic ratio $2\mu_p/\hbar$	γ_p	$2.675\,221\,8708(11)\times10^{8}$	s^{-1} T^{-1}	4.3×10^{-10}
		$42.577\,478\,461(18)$	MHz T^{-1}	4.3×10^{-10}
shielded proton gyromagnetic ratio $2\mu'_p/\hbar$ (H_2O, sphere, 25 °C)	γ'_p	$2.675\,153\,194(11)\times10^{8}$	s^{-1} T^{-1}	4.1×10^{-9}
		$42.576\,385\,43(17)$	MHz T^{-1}	4.1×10^{-9}
Neutron, n				
neutron mass	m_n	$1.674\,927\,500\,56(85)\times10^{-27}$	kg	5.1×10^{-10}
		$1.008\,664\,916\,06(40)$	u	4.0×10^{-10}
energy equivalent	$m_n c^2$	$1.505\,349\,765\,14(76)\times10^{-10}$	J	5.1×10^{-10}
		$939.565\,421\,94(48)$	MeV	5.1×10^{-10}
neutron-electron mass ratio	m_n/m_e	$1838.683\,662\,00(74)$		4.0×10^{-10}
neutron-muon mass ratio	m_n/m_μ	$8.892\,484\,08(20)$		2.2×10^{-8}
neutron-tau mass ratio	m_n/m_τ	$0.528\,779(36)$		6.8×10^{-5}
neutron-proton mass ratio	m_n/m_p	$1.001\,378\,419\,46(40)$		4.0×10^{-10}
neutron-proton mass difference	m_n-m_p	$2.305\,574\,61(67)\times10^{-30}$	kg	2.9×10^{-7}
		$1.388\,449\,48(40)\times10^{-3}$	u	2.9×10^{-7}
energy equivalent	$(m_n-m_p)c^2$	$2.072\,147\,12(60)\times10^{-13}$	J	2.9×10^{-7}
		$1.293\,332\,51(38)$	MeV	2.9×10^{-7}
neutron molar mass $N_A m_n$	$M(\mathrm{n}), M_n$	$1.008\,664\,917\,12(51)\times10^{-3}$	kg mol^{-1}	5.1×10^{-10}
reduced neutron Compton wavelength $\hbar/m_n c$	$\lambda\!\!\!^{-}_{C,n}$	$2.100\,194\,1520(11)\times10^{-16}$	m	5.1×10^{-10}
neutron Compton wavelength	$\lambda_{C,n}$	$1.319\,590\,903\,82(67)\times10^{-15}$	[m]*	5.1×10^{-10}
neutron magnetic moment	μ_n	$-9.662\,3653(23)\times10^{-27}$	J T^{-1}	2.4×10^{-7}
to Bohr magneton ratio	μ_n/μ_B	$-1.041\,875\,65(25)\times10^{-3}$		2.4×10^{-7}
to nuclear magneton ratio	μ_n/μ_N	$-1.913\,042\,76(45)$		2.4×10^{-7}
neutron g-factor $2\mu_n/\mu_N$	g_n	$-3.826\,085\,52(90)$		2.4×10^{-7}
neutron-electron magnetic moment ratio	μ_n/μ_e	$1.040\,668\,84(24)\times10^{-3}$		2.4×10^{-7}
neutron-proton magnetic moment ratio	μ_n/μ_p	$-0.684\,979\,35(16)$		2.4×10^{-7}
neutron to shielded proton magnetic				

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Quantity	Symbol	Value	Unit	Relative std. uncert. u_r
moment ratio (H_2O, sphere, 25 °C)	μ_n/μ'_p	$-0.684\,996\,94(16)$		2.4×10^{-7}
neutron gyromagnetic ratio $2\lvert\mu_n\rvert/\hbar$	γ_n	$1.832\,471\,74(43)\times10^{8}$	$s^{-1}\,T^{-1}$	2.4×10^{-7}
		$29.164\,6935(69)$	MHz T^{-1}	2.4×10^{-7}
		Deuteron, d		
deuteron mass	m_d	$3.343\,583\,7768(10)\times10^{-27}$	kg	3.1×10^{-10}
		$2.013\,553\,212\,544(15)$	u	7.4×10^{-12}
energy equivalent	m_dc^2	$3.005\,063\,234\,91(94)\times10^{-10}$	J	3.1×10^{-10}
		$1875.612\,945\,00(58)$	MeV	3.1×10^{-10}
deuteron-electron mass ratio	m_d/m_e	$3670.482\,967\,655(63)$		1.7×10^{-11}
deuteron-proton mass ratio	m_d/m_p	$1.999\,007\,501\,2699(84)$		4.2×10^{-12}
deuteron molar mass N_Am_d	$M(d), M_d$	$2.013\,553\,214\,66(63)\times10^{-3}$	kg mol^{-1}	3.1×10^{-10}
deuteron rms charge radius	r_d	$2.127\,78(27)\times10^{-15}$	m	1.3×10^{-4}
deuteron magnetic moment	μ_d	$4.330\,735\,087(11)\times10^{-27}$	J T^{-1}	2.6×10^{-9}
to Bohr magneton ratio	μ_d/μ_B	$4.669\,754\,568(12)\times10^{-4}$		2.6×10^{-9}
to nuclear magneton ratio	μ_d/μ_N	$0.857\,438\,2335(22)$		2.6×10^{-9}
deuteron g-factor μ_d/μ_N	g_d	$0.857\,438\,2335(22)$		2.6×10^{-9}
deuteron-electron magnetic moment ratio	μ_d/μ_e	$-4.664\,345\,550(12)\times10^{-4}$		2.6×10^{-9}
deuteron-proton magnetic moment ratio	μ_d/μ_p	$0.307\,012\,209\,30(79)$		2.6×10^{-9}
deuteron-neutron magnetic moment ratio	μ_d/μ_n	$-0.448\,206\,52(11)$		2.4×10^{-7}
		Triton, t		
triton mass	m_t	$5.007\,356\,7512(16)\times10^{-27}$	kg	3.1×10^{-10}
		$3.015\,500\,715\,97(10)$	u	3.4×10^{-11}
energy equivalent	m_tc^2	$4.500\,387\,8119(14)\times10^{-10}$	J	3.1×10^{-10}
		$2808.921\,136\,68(88)$	MeV	3.1×10^{-10}
triton-electron mass ratio	m_t/m_e	$5496.921\,535\,51(21)$		3.8×10^{-11}
triton-proton mass ratio	m_t/m_p	$2.993\,717\,034\,03(10)$		3.4×10^{-11}
triton molar mass N_Am_t	$M(t), M_t$	$3.015\,500\,719\,13(94)\times10^{-3}$	kg mol^{-1}	3.1×10^{-10}
triton magnetic moment	μ_t	$1.504\,609\,5178(30)\times10^{-26}$	J T^{-1}	2.0×10^{-9}
to Bohr magneton ratio	μ_t/μ_B	$1.622\,393\,6648(32)\times10^{-3}$		2.0×10^{-9}
to nuclear magneton ratio	μ_t/μ_N	$2.978\,962\,4650(59)$		2.0×10^{-9}
triton g-factor $2\mu_t/\mu_N$	g_t	$5.957\,924\,930(12)$		2.0×10^{-9}
		Helion, h		
helion mass	m_h	$5.006\,412\,7862(16)\times10^{-27}$	kg	3.1×10^{-10}
		$3.014\,932\,246\,932(74)$	u	2.5×10^{-11}
energy equivalent	m_hc^2	$4.499\,539\,4185(14)\times10^{-10}$	J	3.1×10^{-10}
		$2808.391\,611\,12(88)$	MeV	3.1×10^{-10}
helion-electron mass ratio	m_h/m_e	$5495.885\,279\,84(16)$		2.9×10^{-11}
helion-proton mass ratio	m_h/m_p	$2.993\,152\,671\,552(70)$		2.4×10^{-11}
helion molar mass N_Am_h	$M(h), M_h$	$3.014\,932\,250\,10(94)\times10^{-3}$	kg mol^{-1}	3.1×10^{-10}
helion magnetic moment	μ_h	$-1.074\,617\,551\,98(93)\times10^{-26}$	J T^{-1}	8.7×10^{-10}
to Bohr magneton ratio	μ_h/μ_B	$-1.158\,740\,980\,83(94)\times10^{-3}$		8.1×10^{-10}
to nuclear magneton ratio	μ_h/μ_N	$-2.127\,625\,3498(17)$		8.1×10^{-10}
helion g-factor $2\mu_h/\mu_N$	g_h	$-4.255\,250\,6995(34)$		8.1×10^{-10}
shielded helion magnetic moment	μ'_h	$-1.074\,553\,110\,35(93)\times10^{-26}$	J T^{-1}	8.7×10^{-10}

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(gas, sphere, 25 °C)				
to Bohr magneton ratio	$\mu'_{\mathrm{h}}/\mu_{\mathrm{B}}$	$-1.158\,671\,494\,57(94) \times 10^{-3}$		8.1×10^{-10}
to nuclear magneton ratio	$\mu'_{\mathrm{h}}/\mu_{\mathrm{N}}$	$-2.127\,497\,7624(17)$		8.1×10^{-10}
shielded helion to proton magnetic moment ratio (gas, sphere, 25 °C)	$\mu'_{\mathrm{h}}/\mu_{\mathrm{p}}$	$-0.761\,766\,577\,21(66)$		8.6×10^{-10}
shielded helion to shielded proton magnetic moment ratio (gas/H_2O, spheres, 25 °C)	$\mu'_{\mathrm{h}}/\mu'_{\mathrm{p}}$	$-0.761\,786\,1334(31)$		4.0×10^{-9}
shielded helion gyromagnetic ratio $2\lvert\mu'_{\mathrm{h}}\rvert/\hbar$ (gas, sphere, 25 °C)	γ'_{h}	$2.037\,894\,6078(18) \times 10^{8}$	$\mathrm{s^{-1}\,T^{-1}}$	8.7×10^{-10}
		$32.434\,100\,033(28)$	$\mathrm{MHz\,T^{-1}}$	8.7×10^{-10}
		Alpha particle, α		
alpha particle mass	m_{α}	$6.644\,657\,3450(21) \times 10^{-27}$	kg	3.1×10^{-10}
		$4.001\,506\,179\,129(62)$	u	1.6×10^{-11}
energy equivalent	$m_{\alpha}c^2$	$5.971\,920\,1997(19) \times 10^{-10}$	J	3.1×10^{-10}
		$3727.379\,4118(12)$	MeV	3.1×10^{-10}
alpha particle to electron mass ratio	$m_{\alpha}/m_{\mathrm{e}}$	$7294.299\,541\,71(17)$		2.4×10^{-11}
alpha particle to proton mass ratio	$m_{\alpha}/m_{\mathrm{p}}$	$3.972\,599\,690\,252(70)$		1.8×10^{-11}
alpha particle rms charge radius	r_{α}	$1.6785(21) \times 10^{-15}$	m	1.2×10^{-3}
alpha particle molar mass $N_{\mathrm{A}}m_{\alpha}$	$M(\alpha), M_{\alpha}$	$4.001\,506\,1833(12) \times 10^{-3}$	$\mathrm{kg\,mol^{-1}}$	3.1×10^{-10}

[*] The symbol [m] denotes m/(Hz s). If angles are dimensionless, as in the current SI, then Hz s = 1. If angles have a dimension, then Hz s = cycle.

[†] Value recommended by the Particle Data Group (Workman, *et al.*, 2022).

[‡] Based on the ratio of the masses of the W and Z bosons $m_{\mathrm{W}}/m_{\mathrm{Z}}$ recommended by the Particle Data Group (Workman, *et al.*, 2022). The value for $\sin^2\theta_{\mathrm{W}}$ they recommend, which is based on a variant of the modified minimal subtraction ($\overline{\mathrm{MS}}$) scheme, is $\sin^2\hat{\theta}_{\mathrm{W}}(M_{\mathrm{Z}}) = 0.231\,22(4)$.

[§] This and other constants involving m_{τ} are based on $m_{\tau}c^2$ in MeV recommended by the Particle Data Group (Workman, *et al.*, 2022).