

## Fundamental Physical Constants — Non-SI units

Quantity	Symbol	Value	Unit	Relative std. uncert. $u_r$
electron volt: ( $e/C$ ) J	eV	$1.602\,176\,53(14) \times 10^{-19}$	J	$8.5 \times 10^{-8}$
(unified) atomic mass unit: $1\text{ u} = m_{\text{u}} = \frac{1}{12}m(^{12}\text{C})$ $= 10^{-3}\text{ kg mol}^{-1}/N_{\text{A}}$	u	$1.660\,538\,86(28) \times 10^{-27}$	kg	$1.7 \times 10^{-7}$
Natural units (n.u.)				
n.u. of velocity: speed of light in vacuum	$c, c_0$	299 792 458	$\text{m s}^{-1}$	(exact)
n.u. of action: reduced Planck constant ( $\hbar/2\pi$ )	$\hbar$	$1.054\,571\,68(18) \times 10^{-34}$	J s	$1.7 \times 10^{-7}$
in eV s		$6.582\,119\,15(56) \times 10^{-16}$	eV s	$8.5 \times 10^{-8}$
in MeV fm	$\hbar c$	197.326 968(17)	MeV fm	$8.5 \times 10^{-8}$
n.u. of mass: electron mass	$m_e$	$9.109\,3826(16) \times 10^{-31}$	kg	$1.7 \times 10^{-7}$
n.u. of energy	$m_e c^2$	$8.187\,1047(14) \times 10^{-14}$	J	$1.7 \times 10^{-7}$
in MeV		0.510 998 918(44)	MeV	$8.6 \times 10^{-8}$
n.u. of momentum	$m_e c$	$2.730\,924\,19(47) \times 10^{-22}$	$\text{kg m s}^{-1}$	$1.7 \times 10^{-7}$
in MeV/c		0.510 998 918(44)	MeV/c	$8.6 \times 10^{-8}$
n.u. of length ( $\hbar/m_e c$ )	$\lambda_{\text{C}}$	$386.159\,2678(26) \times 10^{-15}$	m	$6.7 \times 10^{-9}$
n.u. of time	$\hbar/m_e c^2$	$1.288\,088\,6677(86) \times 10^{-21}$	s	$6.7 \times 10^{-9}$
Atomic units (a.u.)				
a.u. of charge: elementary charge	$e$	$1.602\,176\,53(14) \times 10^{-19}$	C	$8.5 \times 10^{-8}$
a.u. of mass: electron mass	$m_e$	$9.109\,3826(16) \times 10^{-31}$	kg	$1.7 \times 10^{-7}$
a.u. of action: reduced Planck constant ( $\hbar/2\pi$ )	$\hbar$	$1.054\,571\,68(18) \times 10^{-34}$	J s	$1.7 \times 10^{-7}$
a.u. of length: Bohr radius (bohr) ( $\alpha/4\pi R_{\infty}$ )	$a_0$	$0.529\,177\,2108(18) \times 10^{-10}$	m	$3.3 \times 10^{-9}$
a.u. of energy: Hartree energy (hartree) ( $e^2/4\pi\epsilon_0 a_0 = 2R_{\infty}hc = \alpha^2 m_e c^2$ )	$E_{\text{h}}$	$4.359\,744\,17(75) \times 10^{-18}$	J	$1.7 \times 10^{-7}$
a.u. of time	$\hbar/E_{\text{h}}$	$2.418\,884\,326\,505(16) \times 10^{-17}$	s	$6.6 \times 10^{-12}$
a.u. of force	$E_{\text{h}}/a_0$	$8.238\,7225(14) \times 10^{-8}$	N	$1.7 \times 10^{-7}$
a.u. of velocity ( $\alpha c$ )	$a_0 E_{\text{h}}/\hbar$	$2.187\,691\,2633(73) \times 10^6$	$\text{m s}^{-1}$	$3.3 \times 10^{-9}$
a.u. of momentum	$\hbar/a_0$	$1.992\,851\,66(34) \times 10^{-24}$	$\text{kg m s}^{-1}$	$1.7 \times 10^{-7}$
a.u. of current	$e E_{\text{h}}/\hbar$	$6.623\,617\,82(57) \times 10^{-3}$	A	$8.5 \times 10^{-8}$
a.u. of charge density	$e/a_0^3$	$1.081\,202\,317(93) \times 10^{12}$	$\text{C m}^{-3}$	$8.6 \times 10^{-8}$
a.u. of electric potential	$E_{\text{h}}/e$	27.211 3845(23)	V	$8.5 \times 10^{-8}$
a.u. of electric field	$E_{\text{h}}/ea_0$	$5.142\,206\,42(44) \times 10^{11}$	$\text{V m}^{-1}$	$8.6 \times 10^{-8}$
a.u. of electric field gradient	$E_{\text{h}}/ea_0^2$	$9.717\,361\,82(83) \times 10^{21}$	$\text{V m}^{-2}$	$8.6 \times 10^{-8}$
a.u. of electric dipole moment	$ea_0$	$8.478\,353\,09(73) \times 10^{-30}$	C m	$8.6 \times 10^{-8}$

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a.u. of electric quadrupole moment	$ea_0^2$	$4.486\,551\,24(39) \times 10^{-40}$	C m <sup>2</sup>	$8.6 \times 10^{-8}$
a.u. of electric polarizability	$e^2 a_0^2 / E_h$	$1.648\,777\,274(16) \times 10^{-41}$	C <sup>2</sup> m <sup>2</sup> J <sup>-1</sup>	$1.0 \times 10^{-8}$
a.u. of 1 <sup>st</sup> hyperpolarizability	$e^3 a_0^3 / E_h^2$	$3.206\,361\,51(28) \times 10^{-53}$	C <sup>3</sup> m <sup>3</sup> J <sup>-2</sup>	$8.7 \times 10^{-8}$
a.u. of 2 <sup>nd</sup> hyperpolarizability	$e^4 a_0^4 / E_h^3$	$6.235\,3808(11) \times 10^{-65}$	C <sup>4</sup> m <sup>4</sup> J <sup>-3</sup>	$1.7 \times 10^{-7}$
a.u. of magnetic flux density	$\hbar / ea_0^2$	$2.350\,517\,42(20) \times 10^5$	T	$8.6 \times 10^{-8}$
a.u. of magnetic dipole moment ( $2\mu_B$ )	$\hbar e / m_e$	$1.854\,801\,90(16) \times 10^{-23}$	J T <sup>-1</sup>	$8.6 \times 10^{-8}$
a.u. of magnetizability	$e^2 a_0^2 / m_e$	$7.891\,036\,60(13) \times 10^{-29}$	J T <sup>-2</sup>	$1.7 \times 10^{-8}$
a.u. of permittivity ( $10^7 / c^2$ )	$e^2 / a_0 E_h$	$1.112\,650\,056 \dots \times 10^{-10}$	F m <sup>-1</sup>	(exact)