

Physical Constants and Measured Values

Symbol	Description	Numerical Value
c	Speed of light in vacuum	$299\,792\,458\text{ m s}^{-1}$, exactly
μ_0	Permeability of vacuum	$4\pi \times 10^{-7}\text{ N A}^{-2}$, exactly
ϵ_0	Permittivity of vacuum where $c = 1/\sqrt{\epsilon_0\mu_0}$	$8.854 \times 10^{-12}\text{ C}^2\text{ N}^{-1}\text{ m}^{-2}$
h	Planck constant	$6.626 \times 10^{-34}\text{ J s}$
\hbar	$h/2\pi$	$1.055 \times 10^{-34}\text{ J s}$
G	Gravitational constant	$6.674 \times 10^{-11}\text{ m}^3\text{ kg}^{-1}\text{ s}^{-2}$
e	Elementary charge	$1.602 \times 10^{-19}\text{ C}$
eV	Electron volt	$1.602 \times 10^{-19}\text{ J}$
α	Fine structure constant, $\frac{e^2}{4\pi\epsilon_0\hbar c}$	$\frac{1}{137.0}$
m_e	Electron mass	$9.109 \times 10^{-31}\text{ kg}$
$m_e c^2$	Electron rest-mass energy	0.511 MeV
μ_B	Bohr magneton, $\frac{e\hbar}{2m_e}$	$9.274 \times 10^{-24}\text{ J T}^{-1}$
R_∞	Rydberg energy, $\frac{\alpha^2 m_e c^2}{2}$	13.61 eV
a_0	Bohr radius $\frac{1}{\alpha} \frac{\hbar}{m_e c}$	$0.5292 \times 10^{-10}\text{ m}$
Å	Ångström	10^{-10} m
m_p	Proton mass	$1.673 \times 10^{-27}\text{ kg}$
$m_p c^2$	Proton rest-mass energy	938.272 MeV
$m_n c^2$	Neutron rest-mass energy	939.565 MeV
μ_N	Nuclear magneton, $\frac{e\hbar}{2m_p}$	$5.051 \times 10^{-27}\text{ J T}^{-1}$
fm	Femtometer or Fermi	10^{-15} m
b	Barn	10^{-28} m^2
u	Atomic mass unit, $\frac{1}{12}m(^{12}\text{C atom})$	$1.661 \times 10^{-27}\text{ kg}$
N_A	Avogadro constant, atoms in mole	$6.022 \times 10^{23}\text{ mol}^{-1}$
T_t	Triple-point temperature	273.16 K exactly
k	Boltzmann constant	$1.381 \times 10^{-23}\text{ J K}^{-1}$
R	Molar gas constant, $N_A k$	$8.314\text{ J mol}^{-1}\text{ K}^{-1}$
σ	Stefan-Boltzmann constant, $\frac{\pi^2}{60} \frac{k^4}{\hbar^3 c^2}$	$5.670 \times 10^{-8}\text{ W m}^{-2}\text{ K}^{-4}$
M_E	Mass of Earth	$5.972 \times 10^{24}\text{ kg}$
R_E	Mean radius of Earth	$6.371 \times 10^6\text{ m}$
g	Standard acceleration due to gravity	$9.806\,65\text{ m s}^{-2}$, exactly
atm	Standard atmosphere	101 325 Pa, exactly
M_\odot	Solar mass	$1.989 \times 10^{30}\text{ kg}$
R_\odot	Solar radius	$6.955 \times 10^8\text{ m}$
L_\odot	Solar luminosity	$3.84 \times 10^{26}\text{ W}$
T_\odot	Solar effective temperature	$5.78 \times 10^3\text{ K}$
AU	Astronomical unit, mean Earth-Sun distance	$1.496 \times 10^{11}\text{ m}$
pc	Parsec	$3.086 \times 10^{16}\text{ m}$
	Year	$3.156 \times 10^7\text{ s}$