Constants & Units

Physical Constants

a_0	Bohr radius	5.29177×10^{-9} cm
c	speed of light in vacuum	2.99792×10^{10} cm s^{-1}
e	electron charge	-4.80325×10^{-10} statcoulomb (= esu)
eV	electron volt	1.60218×10^{-12} erg
G	gravitational constant	6.67428×10^{-8} dyne cm^2 g^{-2}
h	Planck′s constant	6.62607×10^{-27} erg s
k	Boltzmann′s constant	1.38065×10^{-16} erg K^{-1}
m_e	electron mass	9.10938×10^{-28} g
m_p	proton mass	1.67262×10^{-24} g
R_∞	Rydberg constant	1.09737×10^{5} cm^{-1}
$R_\infty c$	Rydberg frequency	3.28984×10^{15} s^{-1}
σ	Stefan – Boltzmann constant	5.67040×10^{-5} erg cm^{-2} s^{-1} K^{-4}
σ_T	Thomson cross section	6.65245×10^{-25} cm^2
u	atomic mass unit	1.66054×10^{-24} g

Astronomical Constants

au	astronomical unit	1.49598×10^{13} cm
H_0	Hubble constant	72 km s^{-1} Mpc^{-1}
kpc	kiloparsec	10^3 pc
$L_\odot$	solar bolometric luminosity	3.826×10^{33} erg s^{-1}
ly	light year	9.4605×10^{17} cm
$M_\odot$	solar mass	1.989×10^{33} g
Mpc	megaparsec	10^6 pc
pc	parsec	3.0856×10^{18} cm
$R_\odot$	solar radius	6.9598×10^{10} cm
yr	year	$3.156 \times 10^7 \approx 10^{7.5}$ s

MKS and Gaussian CGS Units

Type	mks unit	cgs unit	conversion
mass	kg	g	10^3 g = 1 kg
length	m	cm	10^2 cm = 1 m
time	s	s	

frequency	Hz	Hz	1 Hz $=$ 1 s^{-1}
charge	coulomb	statcoulomb	3×10^9 statcouloumb $=$ 1 coulomb (1 statcoulomb $=$ 1 esu)
current	ampere	statampere	3×10^9 statamp $=$ 1 amp (1 amp $=$ 1 coulomb s^{-1})
electric field	v m^{-1}	statvolt cm^{-1}	$(1/3) \times 10^{-4}$ statvolt cm^{-1} $=$ 1 v m^{-1}
energy	joule	erg	10^7 erg $=$ 1 joule
force	newton	dyne	10^5 dyne $=$ 1 newton
magnetic field	tesla	gauss	10^4 gauss $=$ 1 tesla
resistance	Ohm	sec cm^{-1}	$(1/9) \times 10^{-11}$ s cm^{-1} $=$ 1 Ohm
temperature	Kelvin	Kelvin	

Other Constants and Units

arcmin	1/60 deg
arcsec	1/60 arcmin
Angstrom	10^{-10} m
dB	$0.1 \log_{10}(P_1/P_2)$
e	$2.71828\ldots$
GHz	10^9 Hz
Jy	10^{-26} W m^{-2} Hz^{-1} (1 mJy $= 10^{-3}$ Jy, 1 μJy $= 10^{-6}$ Jy)
MHz	10^6 Hz
μm	10^{-6} m
π	$3.14159\ldots$
radian	$(180/\pi)$ deg ≈ 206264.8 arcsec

Engineers and physicists prefer mks (meter, kilogram, second) units, so most radio astronomers use mks units to describe their equipment and the results of their observations. Most astrophysicists prefer Gaussian cgs (centimeter, gram, second) units to describe astronomical sources. Thus you have to deal with both systems of units and be able to convert between them in order to do astronomy. J. D. Jackson's *Classical Electrodynamics* has an appendix explaining the different systems in detail.