

## Appendix A

# ASTRONOMICAL AND PHYSICAL CONSTANTS

Astronomical Constants	
Solar mass	$1 M_{\odot} = 1.989 \times 10^{33} \text{ g}$
Solar luminosity	$1 L_{\odot} = 3.826 \times 10^{33} \text{ ergs s}^{-1}$
Solar radius	$1 R_{\odot} = 6.9599 \times 10^{10} \text{ cm}$
Solar effective temperature	$T_{\odot} = 5770 \text{ K}$
Earth mass	$1 M_{\oplus} = 5.974 \times 10^{27} \text{ g}$
Earth radius	$1 R_{\oplus} = 6.378 \times 10^8 \text{ cm}$
Light year	$1 \text{ ly} = 9.4605 \times 10^{17} \text{ cm}$
Parsec	$1 \text{ pc} = 3.0857 \times 10^{18} \text{ cm}$ $= 3.2616 \text{ ly}$
Astronomical unit	$1 \text{ AU} = 1.4960 \times 10^{13} \text{ cm}$
Sidereal day	$= 23^{\text{h}} 56^{\text{m}} 04.09054^{\text{s}}$
Solar day	$= 86400 \text{ s}$
Sidereal year	$= 3.155815 \times 10^7 \text{ s}$
Tropical year	$= 3.155693 \times 10^7 \text{ s}$

Physical Constants		
Gravitational constant	$G$	$= 6.67259 \times 10^{-8} \text{ dyne cm}^2 \text{ g}^{-2}$
Speed of light (exact)	$c$	$= 2.99792458 \times 10^{10} \text{ cm s}^{-1}$
Planck's constant	$h$	$= 6.6260755 \times 10^{-27} \text{ erg s}$
	$\hbar$	$\equiv h/2\pi$
		$= 1.05457266 \times 10^{-27} \text{ erg s}$
Boltzmann's constant	$k$	$= 1.380658 \times 10^{-16} \text{ erg K}^{-1}$
Stefan-Boltzmann constant	$\sigma$	$= 5.67051 \times 10^{-5} \text{ erg cm}^{-2} \text{ s}^{-1} \text{ K}^{-4}$
Radiation constant	$a$	$= 4\sigma/c$
		$= 7.56591 \times 10^{-15} \text{ erg cm}^{-3} \text{ K}^{-4}$
Proton mass	$m_p$	$= 1.6726231 \times 10^{-24} \text{ g}$
Neutron mass	$m_n$	$= 1.674929 \times 10^{-24} \text{ g}$
Electron mass	$m_e$	$= 9.1093897 \times 10^{-28} \text{ g}$
Hydrogen mass	$m_H$	$= 1.673534 \times 10^{-24} \text{ g}$
Atomic mass unit	1 u	$= 1.6605402 \times 10^{-24} \text{ g}$
		$= 931.49432 \text{ MeV}/c^2$
Coulomb law constant (cgs)	$k_C$	$\equiv 1$
	(SI)	$= 8.9875518 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$
Electric charge (cgs)	$e$	$= 4.803206 \times 10^{-10} \text{ esu}$
	(SI)	$= 1.60217733 \times 10^{-19} \text{ C}$
Electron volt	1 eV	$= 1.60217733 \times 10^{-12} \text{ erg}$
Avagadro's number	$N_A$	$= 6.0221367 \times 10^{23} \text{ mole}^{-1}$
Gas constant	$R$	$= 8.314510 \times 10^7 \text{ ergs mole}^{-1} \text{ K}^{-1}$
Bohr radius	$a_0$	$= \hbar^2/m_e c^2$
		$= 5.29177249 \times 10^{-9} \text{ cm}$
Rydberg constant	$R_H$	$= \mu e^4/4\pi\hbar^3 c$
		$= 1.09677585 \times 10^5 \text{ cm}^{-1}$

## Suggested Readings

### TECHNICAL

Cohen, E. Richard, and Taylor, Barry N., "The 1986 Adjustment of the Fundamental Physical Constants," *Reviews of Modern Physics*, 59, 1121, 1987.

Lang, Kenneth R., *Astrophysical Data: Planets and Stars*, Springer-Verlag, New York, 1992.