

# OoMA Fact Sheet

$G = (2/3) \times 10^{-7}$  dyne-cm<sup>2</sup>/gram<sup>2</sup>  
 $c = 3 \times 10^{10}$  cm/sec  
 $k = (1/7) \times 10^{-15}$  erg/K  
 $h = (2/3) \times 10^{-26}$  erg-sec  
 $\hbar = 10^{-27}$  erg-sec  
 $N_A = 6 \times 10^{23}$  nucleons/gram  
 $m_p/m_e = 1836$        $m_p c^2 = 938$  MeV  
 $m_e \approx 10^{-27}$  gm       $m_e c^2 = 511$  keV  
 $e = 4.8 \times 10^{-10}$  esu =  $1.6 \times 10^{-19}$  Coulomb  
 $\alpha = e^2/\hbar c = 1/137$   
 $L_\odot = 4 \times 10^{33}$  erg/sec  
 Fusing H to He yields 0.7% of  $mc^2$   
 He to C & C to Fe about 0.1% of  $mc^2$  each  
 Solar Constant = 1.4 kW/m<sup>2</sup> at 1 AU  
 $M_\odot = 2 \times 10^{33}$  grams       $R_\odot = 7 \times 10^{10}$  cm  
 $R_\oplus = 6371$  km       $M_\oplus = 3 \times 10^{-6} M_\odot$   
 $M_J = 10^{-3} M_\odot$   
 Hubble radius =  $c/H_0 = 1.3 \times 10^{28}$  cm  
 Critical density  $\sim 10^{-29}$  g/cm<sup>3</sup>  
 $\sigma_T = (2/3) \times 10^{-24}$  cm<sup>2</sup>  
 $\sigma_{SB} = 5.67 \times 10^{-5}$  erg/cm<sup>2</sup>/sec/K<sup>4</sup>  
 Flux from a blackbody surface is  $\sigma_{SB} T^4$   
 1 Farad =  $9 \times 10^{11}$  cm  
 1 ohm =  $1/(9 \times 10^{11})$  sec/cm  
 1 gram calorie = 4.2 Watt-sec or Joules  
 Dietary calories are really kilocalories.  
 1 kiloton (kT) of TNT is the kinetic energy of 1000 metric tonnes moving at 2.9 km/sec. [1 kT =  $10^{12}$  gram-cal exactly]  
 Supernova kinetic energy =  $10^{51}$  ergs  
 1 AU =  $(3/2) \times 10^{13}$  cm  
 1 radian =  $2 \times 10^5$  arc-seconds  
 1 square arcsec =  $2.4 \times 10^{-11}$  steradians  
 1 pc =  $3 \times 10^{18}$  cm  
 1 erg =  $6 \times 10^{11}$  eV  
 1 eV  $\sim 12,000$  K      1 eV  $\sim 1.2$   $\mu$ m  
 $hc/k \approx 1.44$  cm K  
 1 Jy =  $10^{-23}$  ergs/cm<sup>2</sup>/sec/Hz  
 1 year  $\approx \pi \times 10^7$  seconds  
 1 Mpc is 1 km/sec for 1000 Gyr  
 One atmosphere or 1 bar =  $10^6$  dyne/cm<sup>2</sup>  
 Maximum mass for white dwarfs:  $1.4 M_\odot$

Typical mass of neutron stars:  $1.4 M_\odot$

Stellar spectra – from “early” = hot to “late” = cool:

Oh Be A Fine Girl Kiss Me Later Tonight

Luminosity class – the Roman numeral:

“I” = supergiant = low surface gravity

“III” = giant, “V” = dwarf = main sequence star = high surface gravity.

Sp.Type	$\log(L/L_\odot)$	M/ $M_\odot$	$T_{eff}$ K
O5V	5.82	40	40,000
B0V	4.66	18	28,000
B5V	2.94	9	15,500
A0V	1.78	3	9900
A5V	1.15	2	8500
F0V	0.88	1.7	7400
F5V	0.54	1.3	6580
G0V	0.15	1.1	6030
G5V	-0.11	0.9	5520
K0V	-0.38	0.8	4900
K5V	-0.78	0.7	4130
M0V	-1.22	0.5	3480
M5V	-1.90	0.2	2800
L0	-3.65		2200
L5	-4.11		1700
T0	-4.57		1300
T5	-5.02		1000

1 magnitude is -4 db

A decibel (db) is a factor of  $10^{0.1}$  in power.

0<sup>th</sup> mag at V  $\approx 10^3$  photons/cm<sup>2</sup>/sec/Å.

$m_{bol} = 0$  for  $2.5 \times 10^{-5}$  erg/cm<sup>2</sup>/sec.

Bands central wavelengths in  $\mu$ m:

U = 0.36, B = 0.44, V = 0.55, R = 0.7,

I = 0.9, Z = 1.0, J = 1.25, H = 1.6, K =

2.2, L = 3.5, M = 4.6, N = 10, Q = 20

AB magnitudes have the same zeropoint flux in  $F_\nu$  (3631 Jy) in all bands.

Johnson or “Vega” magnitudes have zero-points that follow the spectrum of an A0V star.

$10^{n/10} = 1.26, 1.6, 2, 2.5, 3.2, 4, 5, 6.3, 8.$