

ASTRONOMY: STARS & GALAXIES

EXAM 1 REVIEW SHEET

LIGHT

Electromagnetic spectrum order (γ , X, UV, visible, IR, radio)

Which has largest/smallest wavelength, frequency, energy

Photons vs. waves

Contributions of Newton, Young, Maxwell, Hertz, Herschel

Kirchhoff's Laws (spectra – continuous, emission line, absorption line)

Wien's Law & Stefan-Boltzmann Law – what happens as T is raised/lowered? (i.e. by 2x, 3x, ..)

Inverse square law

GRAVITY & MECHANICS

Kepler's 3 Laws – INCLUDING $M_1 + M_2 = a^3/P^2$

Newtonian Mechanics: $F=ma$, $F(\text{grav})=GMm/r^2$ (**actually just know inverse square law**)

THE SUN

Interior regions – core, radiative zone, convective zone

Atmosphere – photosphere (brightest), chromosphere, corona (hottest)

Solar wind – what is it? Where is it?

Photosphere

Granulation – why do we see it?

Sunspots – how they are produced, What they look like, Temps

Solar Cycle – spot #, latitude, polarity vs. time, effects on climate

Core Nuclear Reactions – pp, CNO – how do they differ? Which operates in the Sun?

The “Solar Neutrino Problem” – What is it? What was the final ‘answer’ to the problem?

STARS

Parallax $p''=1/d(\text{pc})$ **Example: if $p=1/3''$ then $d=3 \text{ pc}$ if $p=1/10''$, $d=10 \text{ pc}$, etc.**

Proper motion – what is it? On what quantities does it depend?

Magnitudes

More negative for brighter stars

Difference of 5 mag is RATIO of 100 in brightness (flux)

B-V “color” as a measure of star temperature. “Alphabet soup photometry”

$$L_*(W) = 4\pi R_*^2 (m^2) \sigma T_*^4 (Wm^{-2})$$

$$\frac{L_2}{L_1} = \left(\frac{R_2}{R_1}\right)^2 \left(\frac{T_2}{T_1}\right)^4$$

Stellar Spectra – **T**, **P**, composition

OBAFGKM

Why spectral lines depend on T – example: Balmer lines of H

HR Diagram – L vs. T

Main Sequence – what is it? How does L and lifetime depend on Mass (roughly – **no calculation**)

WHY are certain stars called Giants, Supergiants, White Dwarfs?