

Main sequence - lie in a band and 90% of stars are main sequence

Giants and Supergiants - lie above main sequence

giants red or blue

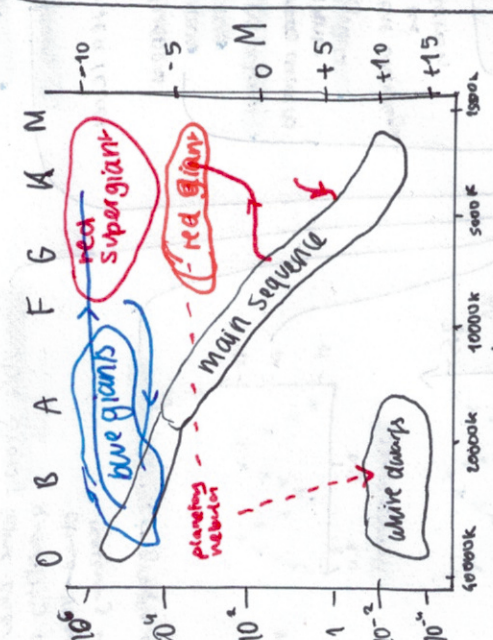
supergiants tend to be red

White dwarf - lie below main sequence

Solar mass star

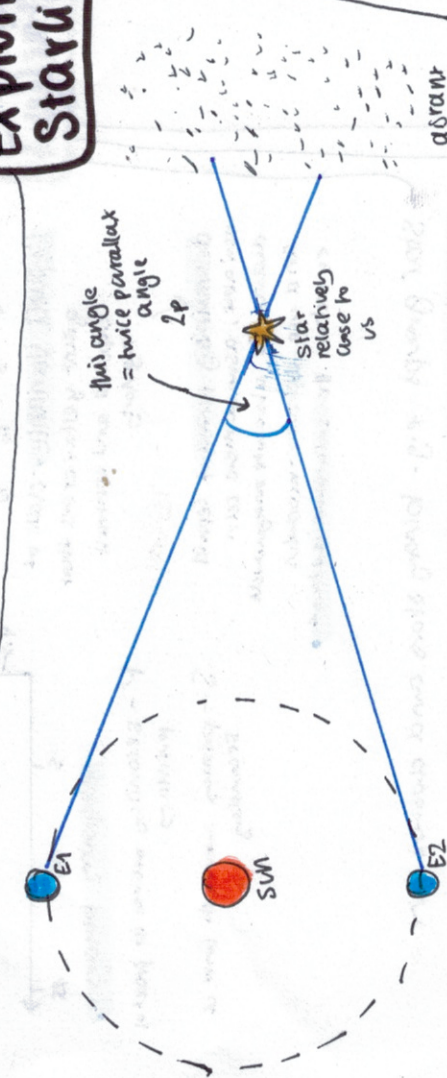
massive star

neutron stars and black holes don't emit in visible range so rest isn't on diagram



H-R Diagram

heliocentric Parallax:



Parallax - nearby objects appear to move relative to distant ones

- a star is observed from two extremities of Earth's orbit
- half of the small apparent shift is called parallax angle
- if parallax angle = 1" then the distance to it is 1pc

$$d = \frac{1}{p}$$

m pc m arcsec

the H-R diagram can also be used for finding distances to stars

in a light-polluted area, limiting magnitude is 3 in a dark-sky site, limiting magnitude is 6

apparent magnitude depends on:

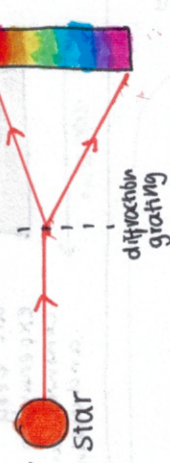
- total energy radiated by star in visible region
- distance to star
- amount of interstellar gas and dust that reflects and absorbs light
- amount of light absorbed/scattered by atmosphere

Absolute magnitude - a star's apparent magnitude if it was 10 parsecs away from us

$$M = (m + 5) - 5 \log d$$

(distance in parsecs)

Spectroscopy



Info obtained from stellar spectrum:

- chemical composition → each element have own unique set of wavelengths
- temperature
- radial velocity → whether it is moving towards or away from us in line of sight

Spectral type can be determined by examining the ratio of hydrogen:helium:other elements

O B A F G K M

40000K ← blue/white yellow red → 2500K

Fine divisions in each category by adding a number e.g. A0, A1, A2...

as distance to a star increases, the brightness/intensity decreases

a magnitude difference of 5.0 corresponds to brightness ratio of 100

∴ magnitude difference of 1.0 corresponds to fifth root of 100 or ≈ 2.51

magnitude difference	ratio of brightness
1.0	2.5
2.0	$2.5 \times 2.5 = 6.3$
3.0	16
4.0	40
5.0	100
6.0	250

Bayer Catalogue

α - alpha brightest star in constellation is alpha

β - beta

γ - gamma

δ - delta

ϵ - epsilon