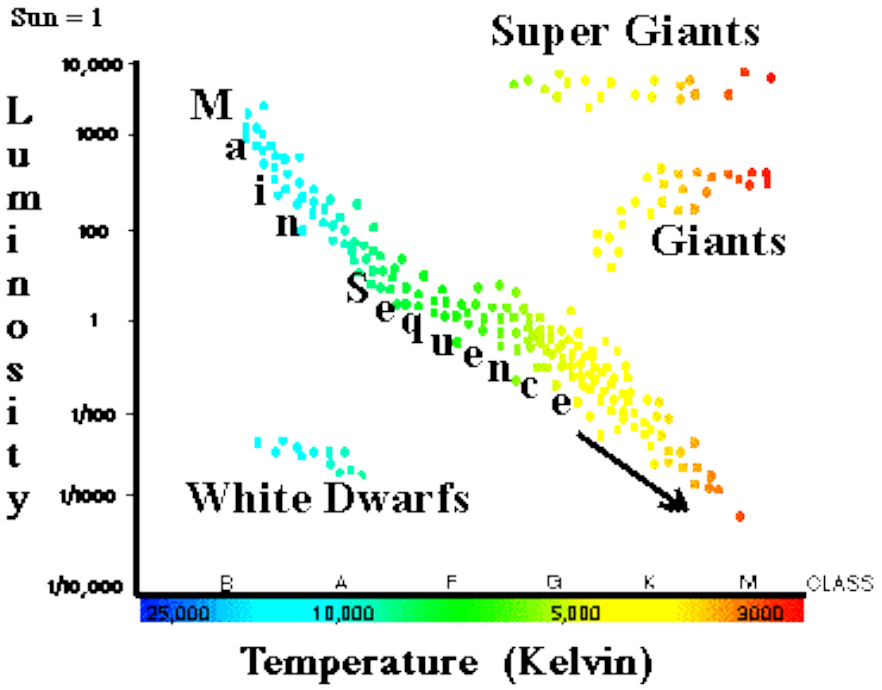
The life and time of stars

Stellar formation, Stellar evolution, Stellar structure and Theoretical stars

T.May, A. QI, S. Bashforth, J.Bello

Luminosity, Brightness and H-R diagrams

- Very useful parameter in measuring and comparing stars.
- Luminosity/intrinsic luminosity Total power radiated(W)
- Also apparent brightness, b, power crossing unit area at the Earth perpendicular to the path of light.
- b= $\frac{L}{4\pi d^2}$



- Colour is related to intrinsic luminosity and therefore mass.
- Standardized brightness of each star.

Stellar nurseries

- Interstellar clouds mostly contain Hydrogen.
- Higher density regions form clouds, this is where stars form.
- Much of H is in molecular form.
- kinetic energy of the gas pressure = potential energy of gravitational force.
- The cloud undergoes gravitational collapse.

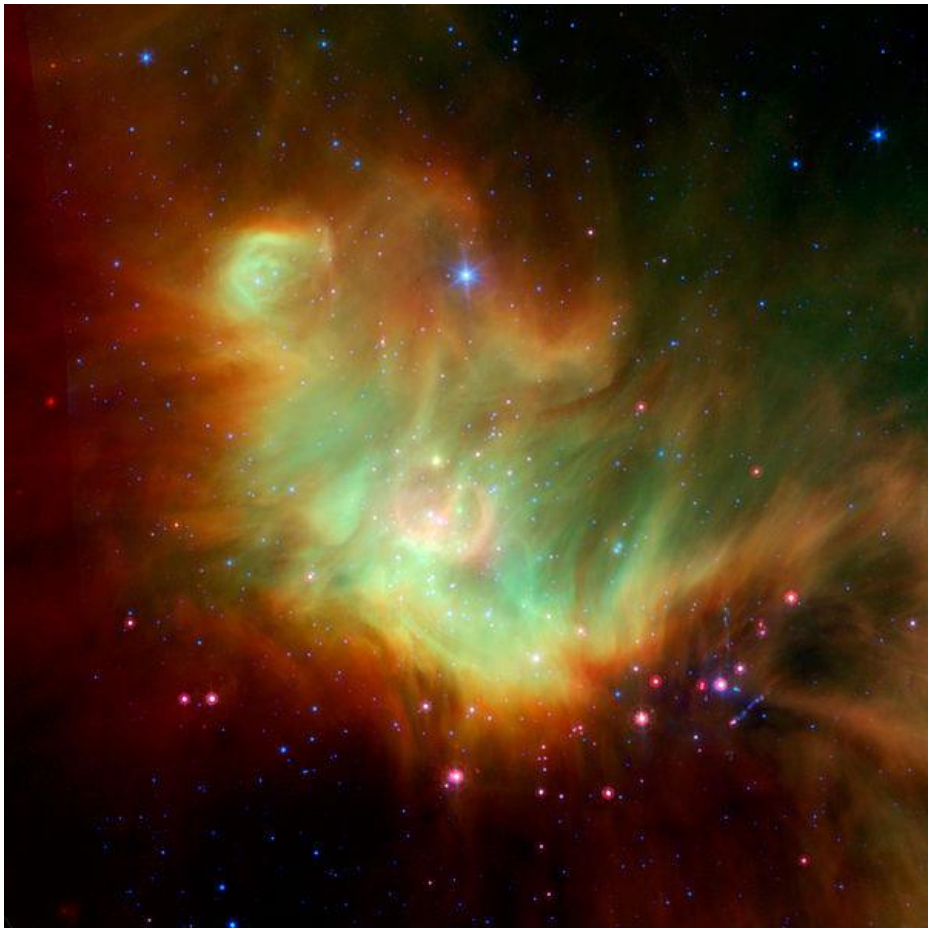
- The mass is called Jeans Mass.
- Cloud breaks down become stellar embryo.

Protostars

- A large mass that forms by contraction out of the gas of a molecular cloud in the interstellar medium.
- During collapse density of cloud increases towards the centre.
- At 2000K H_2 dissociates.
- After a certain density the material if transparent to allow energy to escape.
- Convection within the star and radiation from the exterior allows for further contraction.
- This continues until it is hot enough for pressure to support gravitational collapse.

Observations

- Early stages of a stars life cycle can be seen in infrared.
- Observed in near-IR extinction maps
- Can only be directly observed in our own galaxy.
- Distant galaxies, detection is through spectral signature.
- MWC 349-estimated at 1000 years old
- VLA 1623- First class 0 Protostars, yet to accumulate majority of mass.



Role of mass in the life cycle of the star

- Different masses of stars form via different mechanisms.
- Low-mass star formation, is due to gravitational collapse of rotating density enhancements within molecular clouds.
- Massive stars emit large quantities of radiation which push against infalling material.