Stars

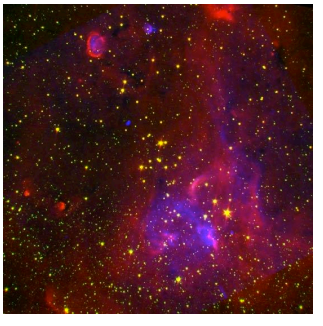
Characteristics

- The Star closest to Earth is the SUN
- The Sun is a very *ordinary* star
  - Ordinary mass, size, temp., brightness, composition, and age

- All the stars we see with the unaided eye (3,000-5,000) are fairly close to us in the Milky Way galaxy
- There are about 100,000,000 stars/galaxy and there are 100's of billions of galaxies

COLOR

- The color of a star tells us the temperature
- Colors follow the rainbow colors
  - « ROY G BIV + white



RED = <3,000 C

YELLOW = 5,500 C

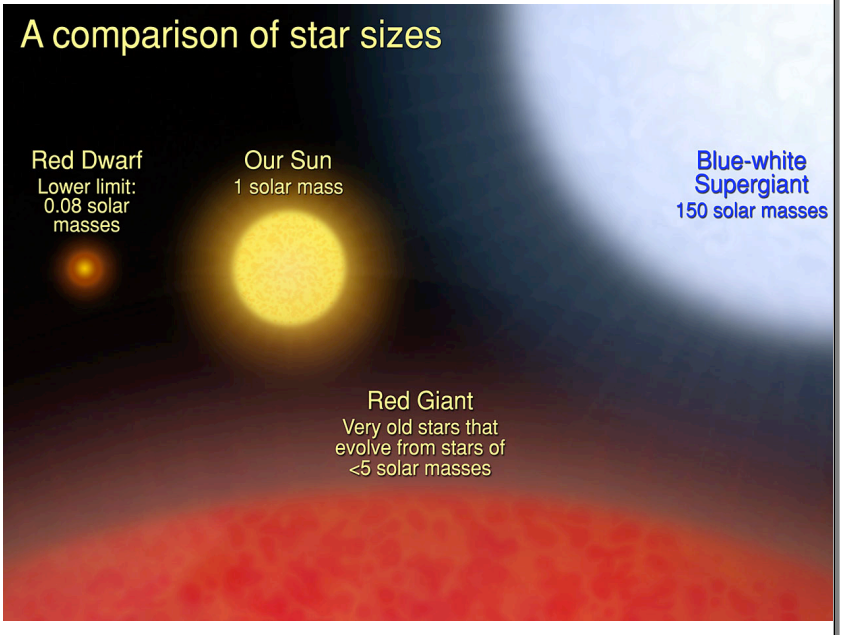
BLUE/WHITE = >30,000 C

SIZE

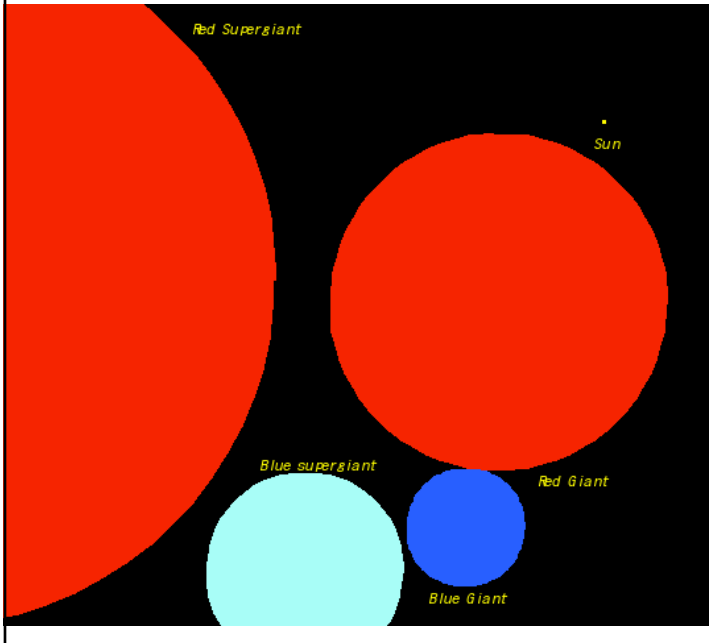
Smallest = < 20km in diameter (neutron stars)

Largest = 1000X larger than Sun

Sun's diameter is 110X larger than Earth's



MASS

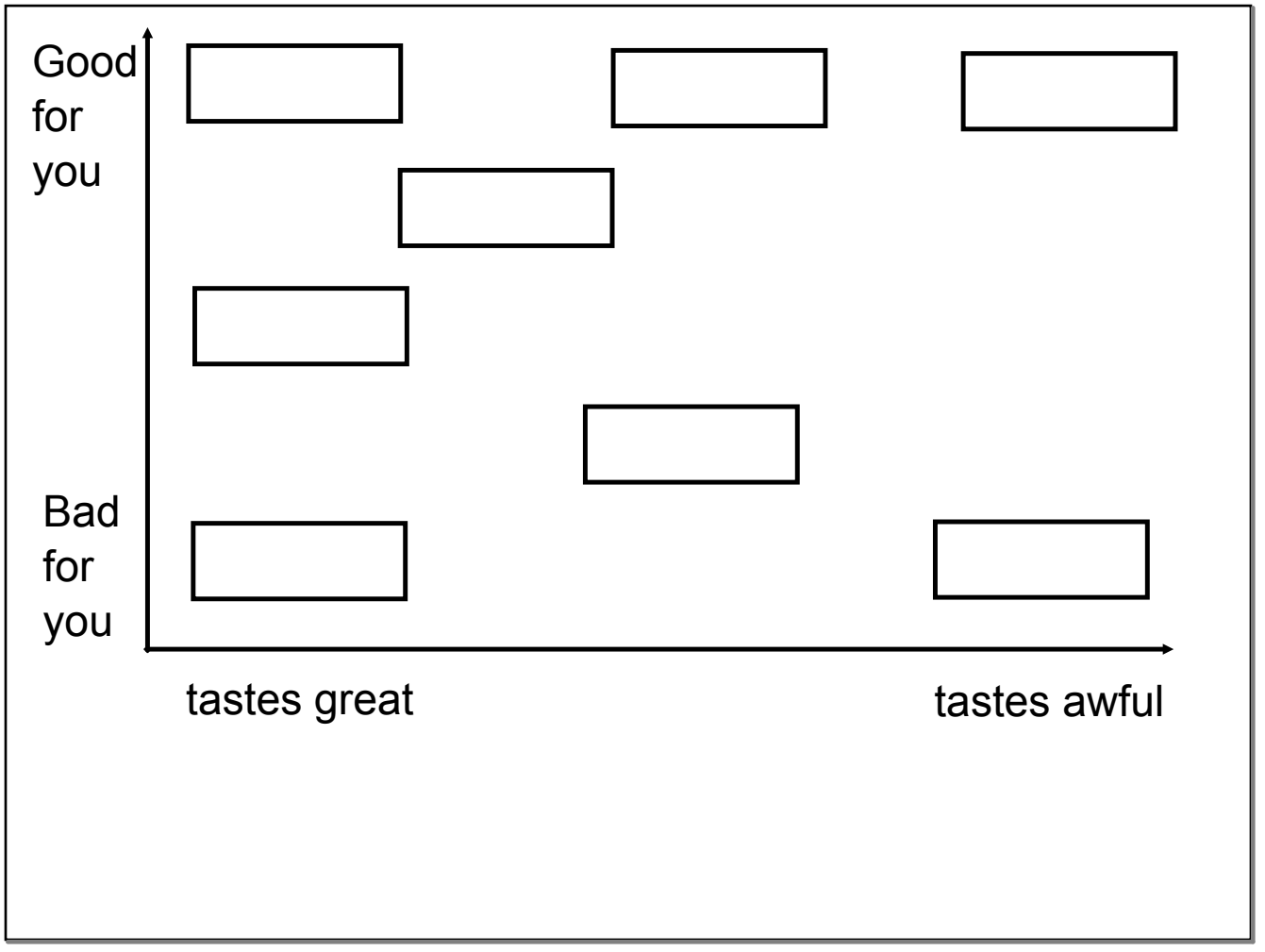


- **Smallest**- 1/50 of Sun's mass
- **Largest**- 50X Sun's mass
- Sun is 330,000X more massive than Earth

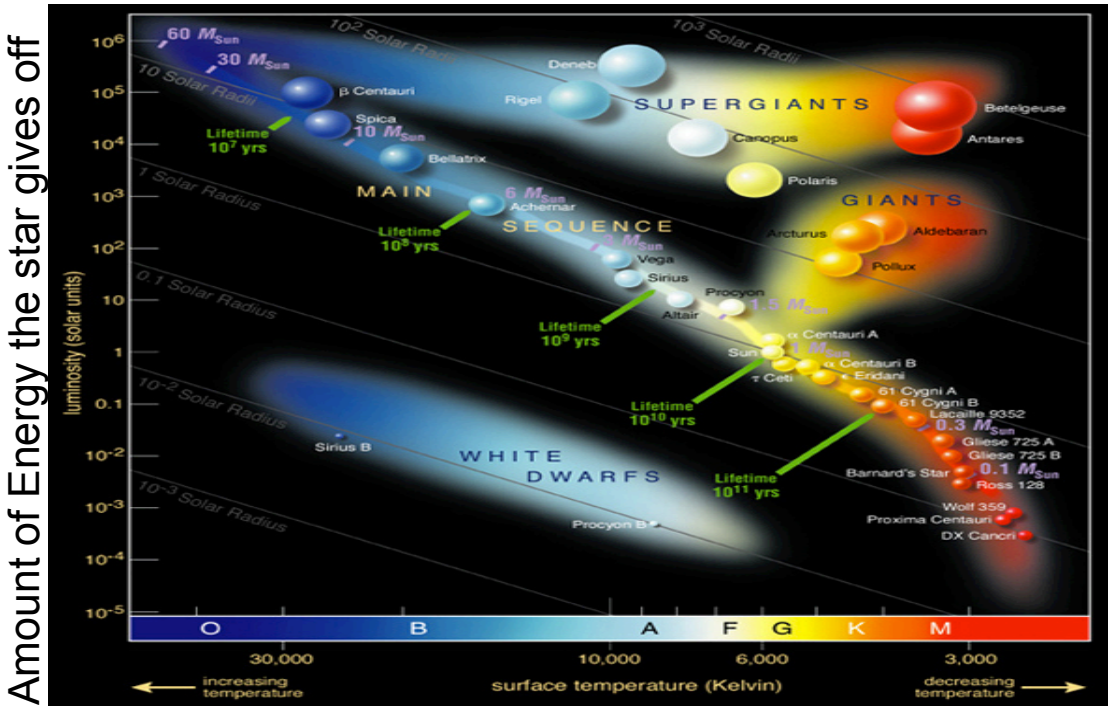
COMPOSITION

- Stars are mainly **Hydrogen** & **Helium**
- Sun:
  - > 75% H
  - > 24% He
  - > 1% other elements
- Stars contain small amounts of C, N, O, and Ca
  - « Very small amounts of all the elements can be found in stars

Stars

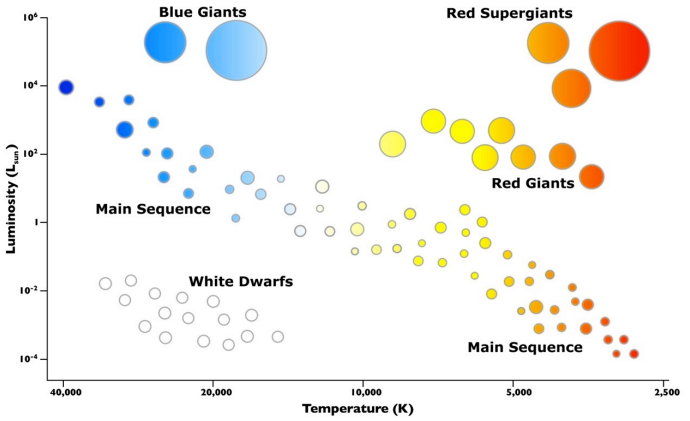


Hertzsprung-Russel Diagram



Classification of Stars

- The **H-R Diagram** is a graph of the absolute magnitude of stars and their temp.
- It shows the 4 general classes of stars



4 Classes of Stars:

Main Sequence Stars: 90% of stars in universe

- > Average brightness for their color
- > White hot stars are bright and red cool stars are dim

Red Giants: Cool but bright

- > Must be very large (100-200X larger than the Sun)

Super Red Giants: Cool but VERY bright

- > Very large (1,000-2,000X larger than the Sun
- > Almost as big as the Solar System

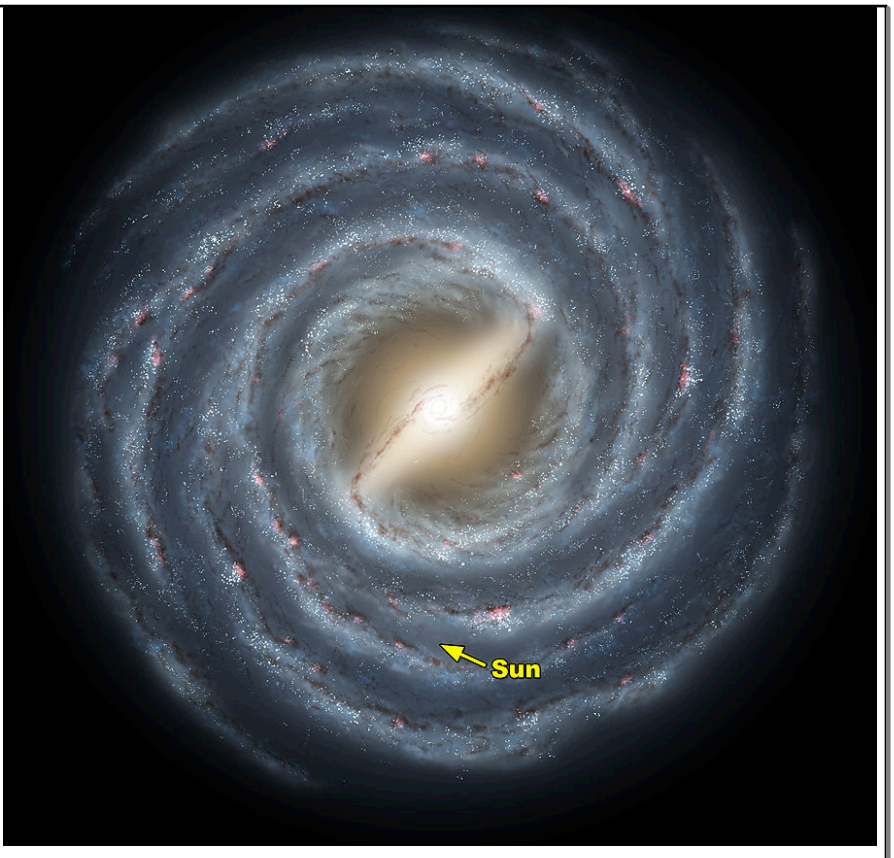
White Dwarfs: Hot but dim

- > Very small (Earth to Jupiter sized)

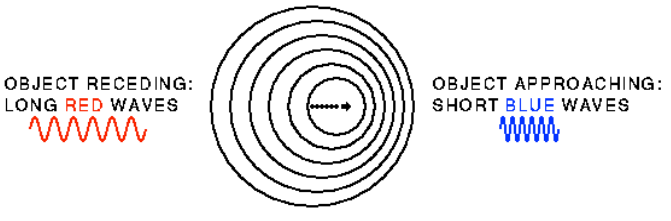
Star Motion

- Stars are actually moving very fast through space
- Most stars are moving **within** galaxies and galaxies are moving **away** from each other

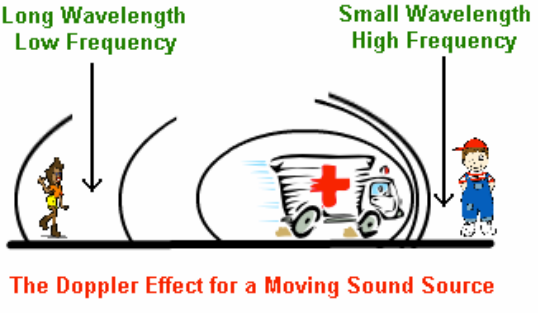
The Sun is moving **2,000,000 mph** as it spins around the milky way galaxy every **200,000,000 years**



- Since the distance between stars is great, we have difficulty seeing this motion
- Using a principle called the **Doppler Effect** we can detect the motion



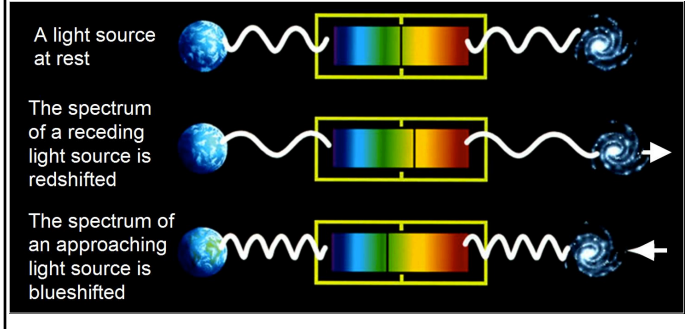
mimic the noise of a plane flying by

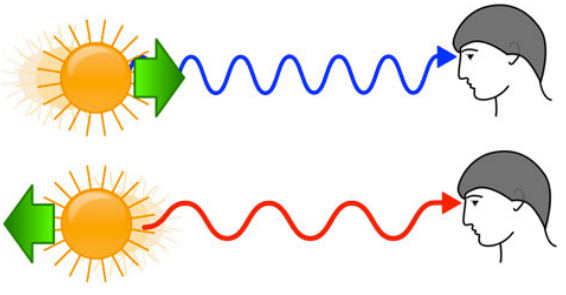


The Doppler Effect for a Moving Sound Source

- **Blue Shift**: stars are moving **towards** us
- **Red Shift:** stars are moving **away** from us

Almost all stars and galaxies are red shifted, so the universe is getting larger (expanding)





HOMEWORK:

Create 10 Test Questions from today's notes

- Include:
  - 3 Matching with H-R Diagram
  - 2 short answer/Fill-in-the-Blank
  - 2 True/False
  - 3 Multiple Choice