

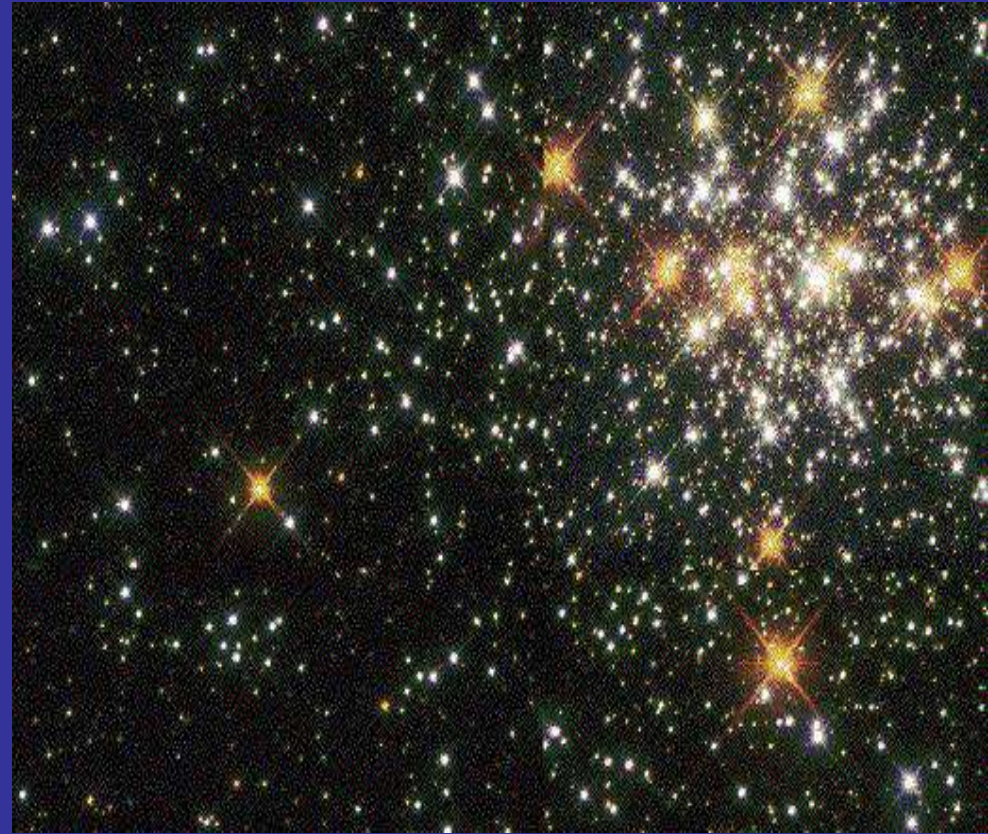


Stars

■ 11-14-08

Stars

- Stars are the only source of light in the universe besides quasars (light from a galactic nucleus); everything else shines by reflected light.



Color and Temperature

- The color and temperature of stars vary
- The color reveals surface temperature
The hottest stars are blue, while the coolest are red



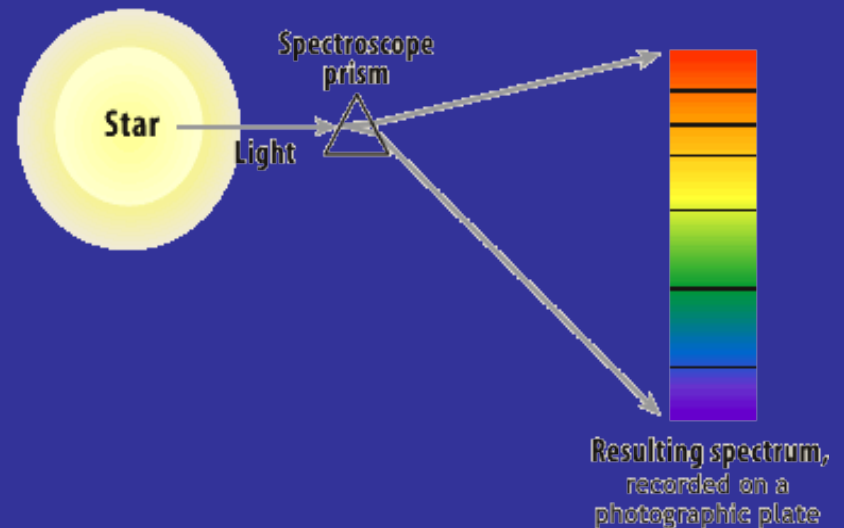


Temperature and color classification

- http://en.wikipedia.org/wiki/Stellar_classification

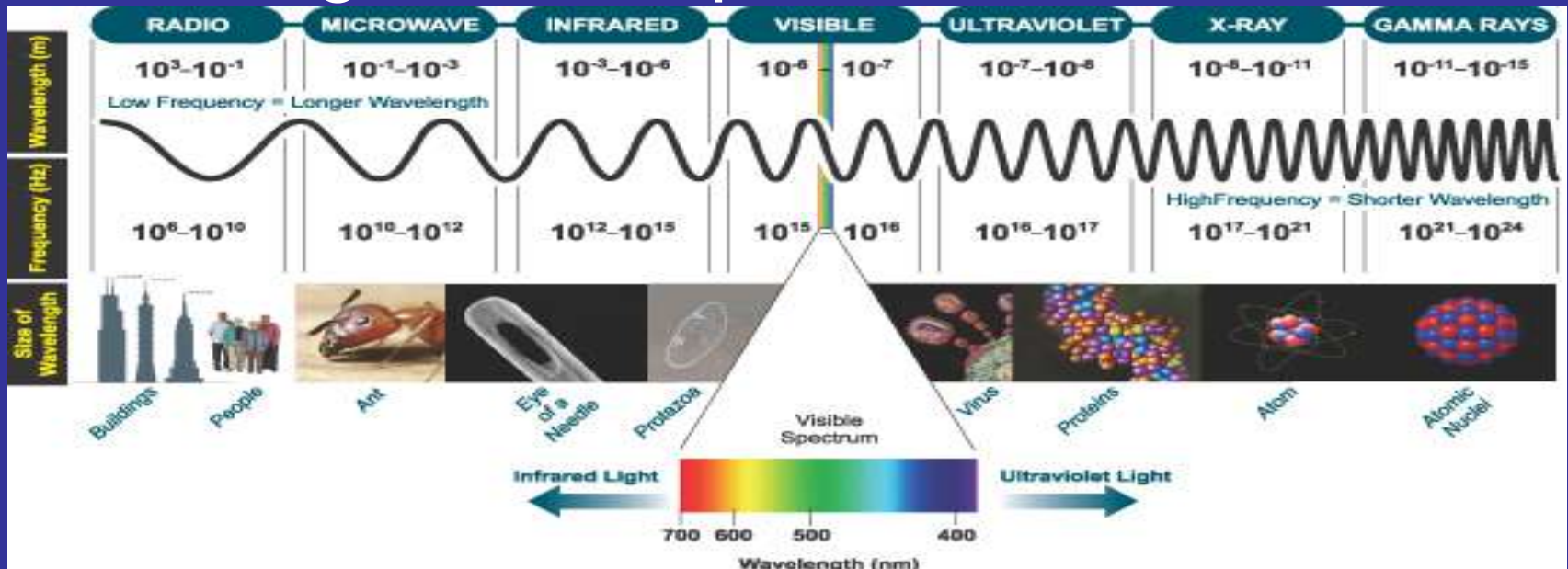
Star light, Star bright.....

- Scientists analyze starlight and break it down to determine the temperature and composition of stars. This is spectroscopy. (we need to take a detour and talk about light for a few minutes.....)



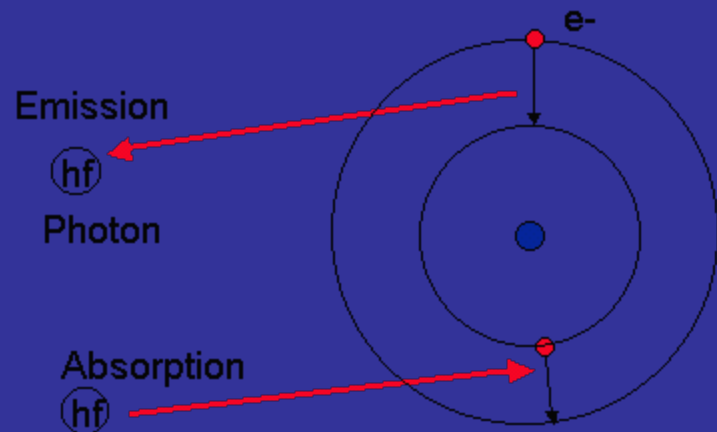
What is light?

- Visible light is a part of the electromagnetic spectrum and is energy travelling in waves/photons



Light.....

- Light is the packet of energy or photon emitted from excited electrons in an atom.
- When photons are emitted from the atom they have specific wavelengths that appear as certain colors in the visible light spectrum (ROYGBIV)





Back to spectroscopy.....

- Each element emits a unique set of wavelengths which are called emission lines. These can be viewed through a spectrograph
- By studying the wavelengths scientists can determine the elements in the star.

Examples of emission lines



Hydrogen



Sodium



Helium



Neon



Mercury

argon (Ar)

oxygen (O)

nitrogen (N)

mercury (Hg)

helium (He)

krypton (Kr)

neon (Ne)

chlorine (Cl)

sodium (Na)

hydrogen (H)

400

450

500

550

600

650

700

nanometers

400

450

500

550

600

650

700

nanometers



Quiz....

- How do scientists know what stars are made of?
- What are most stars made of?
- Which star is hotter a blue star or a yellow star?
- Which color star is the coolest?



Life cycle of a star

- http://aspire.cosmic-ray.org/labs/star_life/starlife_main.html



What are stars made up of?

- They start with Hydrogen and Helium
- Produce other elements through nuclear fusion up until iron. Other elements heavier than iron are produced when a star supernovas.
- <http://www.teachersdomain.org/resource/ess05.sci.ess.eiu.fusion>

Brightness



- To measure brightness there is :
- Apparent magnitude – how bright a star *appears* to be (ex: the Sun)
- Absolute magnitude – how bright or luminous the star truly is. The more negative the number, the brighter the star
- Luminosity – a comparison to the sun's brightness (the sun's luminosity is given a value of 1)



What does brightness depend on?

- A star's brightness can change over time (stage in their lifecycle)
- It can be star size, and distance.
- How are distances to star measured?
- Near stars – Parallax
- Far stars – Cepheids (measuring oscillations of pulsating stars)



Parallax

Six months from now



r

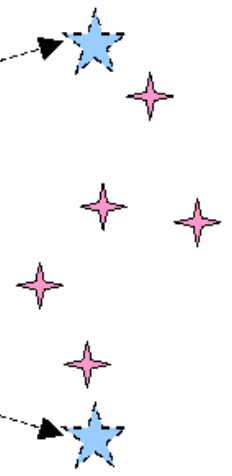
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Now



Six months from now



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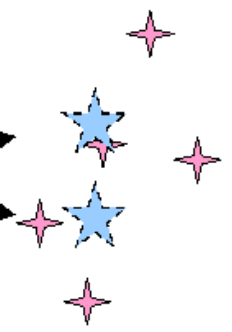
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Now





Hertzprung Russell Diagram

- http://aspire.cosmic-ray.org/labs/star_life/hr_interactive.html



The Sun

- The Sun is the star our planets revolve around.