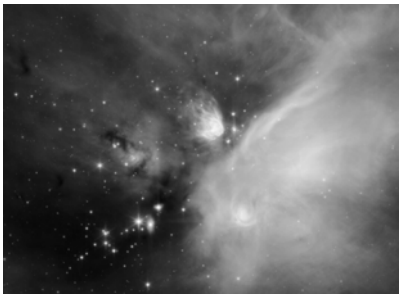
ASTR 1020: Stars & Galaxies

February 18, 2008

- *MasteringAstronomy* Homework on The HR Diagram is due Feb. 25th.
- Reading: Chapter 15, section 15.2.
- Exam 1: February 20th. **(Next Class)**

1

Astronomy Picture of the day



Young Stars in the Rho Ophiuchi Cloud

Cosmic dust clouds and embedded newborn stars glow at infrared wavelengths in this tantalizing false-color view from the Spitzer Space Telescope. 400 ly distance, view is 5 ly across.

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Exam Study Tips

- Study with a friend!
- Check PowerPoints (on class website) against your notes, homeworks- are you comfortable with the relevant concepts?
- Do more quiz and review questions in your text and in *MasteringAstronomy.*
- Check out textbook "Learning Goals" at the beginning of each textbook Chapter and Key Concepts at end of Chapter.
- Review Clicker Questions.
- Exam is closed book but you may bring one sheet of paper (both sides) with notes.

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Exam 1 will cover

- All material discussed in class, readings, and tutorial up through today's class.
- Textbook: Chapters 1 (Sections 1.1-1.2), Chapter 4, Chapter 5, Chapter 14, Chapter 15.
- *MasteringAstronomy* Homeworks on "Scales of the Universe", "Light and Spectroscopy", "The Sun", and "The Properties of Stars".

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- Can you use the formula? Examples in class, homeworks, sample questions.
- You may need to "invert" the equation– for example, solve for T using the equation:

  wavelength = 2,900,000 nm / T

For numerical work- remember units!! Does your answer make sense?

(1 nm = 10^{-9} m; know cm, mm, km)

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The Day of the Exam

Bring a #2 pencil and eraser

Bring a calculator if you think you'll need one

Please be prepared to get started right away at 10:00 am

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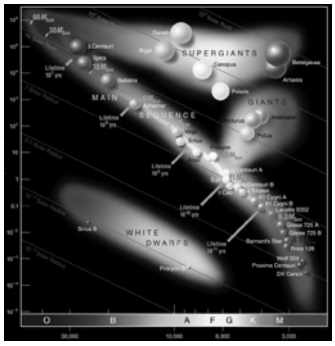
Today's Lecture: What is a Hertzsprung-Russell (H-R) diagram?



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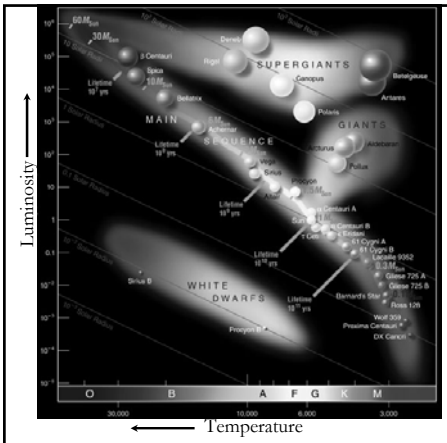

An H-R diagram plots the luminosity and temperature of stars

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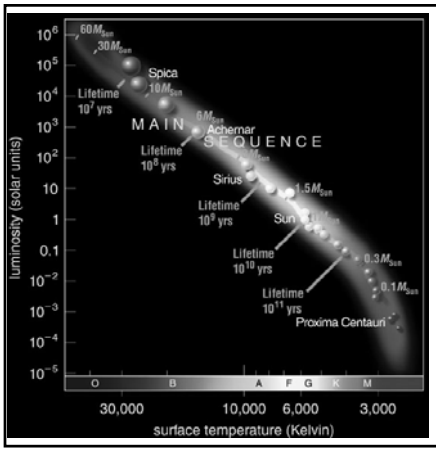

Most stars fall somewhere on the ***main sequence*** of the H-R diagram

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Clicker Question: A star near the top of the main sequence has a <u>luminosity</u> about:

a) Twice the Sun's luminosity
b) Five times the Sun's luminosity
c) 20 to 30 times the Sun's luminosity
d) 10,000 times the Sun's luminosity

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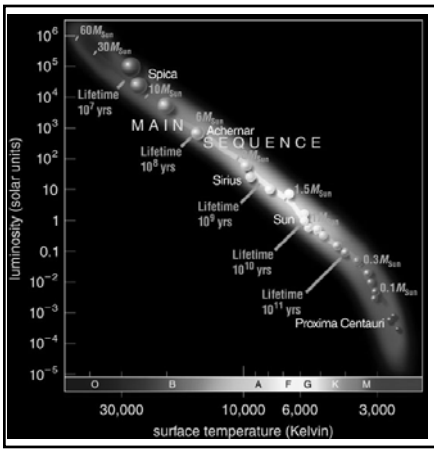

Stars with lower T and higher L than main-sequence stars must have larger radii:

giants and ***supergiants***

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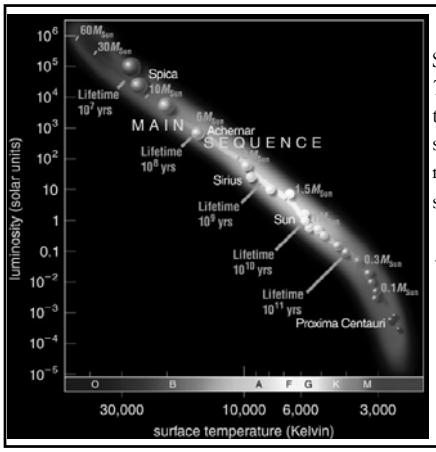


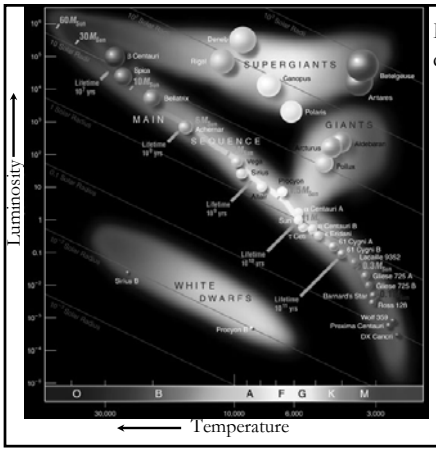
Stars with higher *T* and lower *L* than main-sequence stars must have smaller radii:

white dwarfs

A star's full classification includes spectral type (line identities) and luminosity class (line shapes, related to the size of the star):

I - supergiant
II - bright giant
III - giant
IV - subgiant
V - main sequence

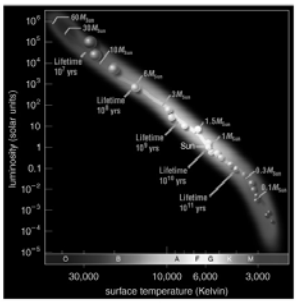
Examples: Sun - G2 V
Sirius - A1 V
Proxima Centauri - M5.5 V
Betelgeuse - M2 I

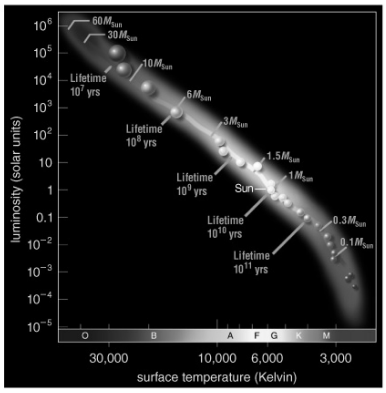


H-R diagram depicts:

Temperature
Color
Spectral Type
Luminosity
Radius

What is the significance of the main sequence?

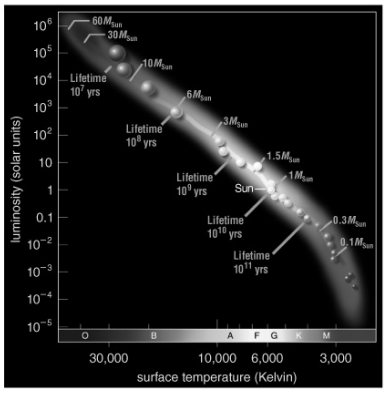




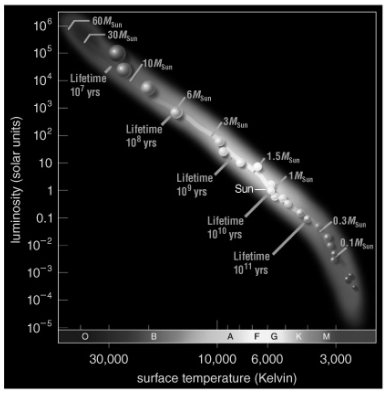
Main-sequence stars are fusing hydrogen into helium in their cores like the Sun

Luminous main-sequence stars are hot (blue)

Less luminous ones are cooler (yellow or red)



Mass measurements of main-sequence stars show that the hot, blue stars are much more massive than the cool, red ones



The mass of a normal, hydrogen-burning star determines its luminosity and spectral type!

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