

Astronomy 16 – Modern Astrophysics

Fall 2014

Week 10

Stellar evolution leads naturally to the topic of stellar remnants – what's left behind when a star's life is over.

Topics:

High-mass star evolution

Supernovae

Planetary nebulae

Degeneracy pressure

White dwarfs

Neutron stars

Black holes

Reading:

Tuesday's class is/was finishing up star formation and stellar evolution (Ch. 17; assigned last week). In Wednesday's lab, we'll discuss some important issues related to observational astronomy (Ch. 6). And in Thursday's class, we'll discuss stellar remnants and the degeneracy pressure that holds some of them up against the tremendous force of their own gravity.

So, read all of Ch. 18 for Thursday.

For Wednesday night, reread sec. 1 of Ch. 6 and also read sections 4 and 5 (skimming the other sections; but looking carefully at the figures and their captions).

Important concepts and related facts to keep in mind as you re-read, and make sure you can answer while/after you've done the reading. We will discuss all of these in class this week.

This week:

Read the derivation of degeneracy pressure (18.1.1) very carefully. Come to class on Thursday ready to ask questions about it.

The mass-radius relationship for white dwarfs in the next section is a nice clear example of the consequences of having a source of pressure that is insensitive to temperature. Do you see how the helium flash (Ch. 17) also depends on this property of degeneracy pressure?

Note the differences between low- and high-mass stellar evolution.

Pay special attention to supernovae – can you describe to a non-expert what a core-collapse supernova is?