September 13, 2010

Exams will be returned Wednesday, answers posted on web page.

Sky Watch - working together is encouraged, but you must write up **independent** reports in your own words.

Reading, Sections 6.2, 6.3. Sections 1.2, 2.1, 2.4, 2.5 for background.

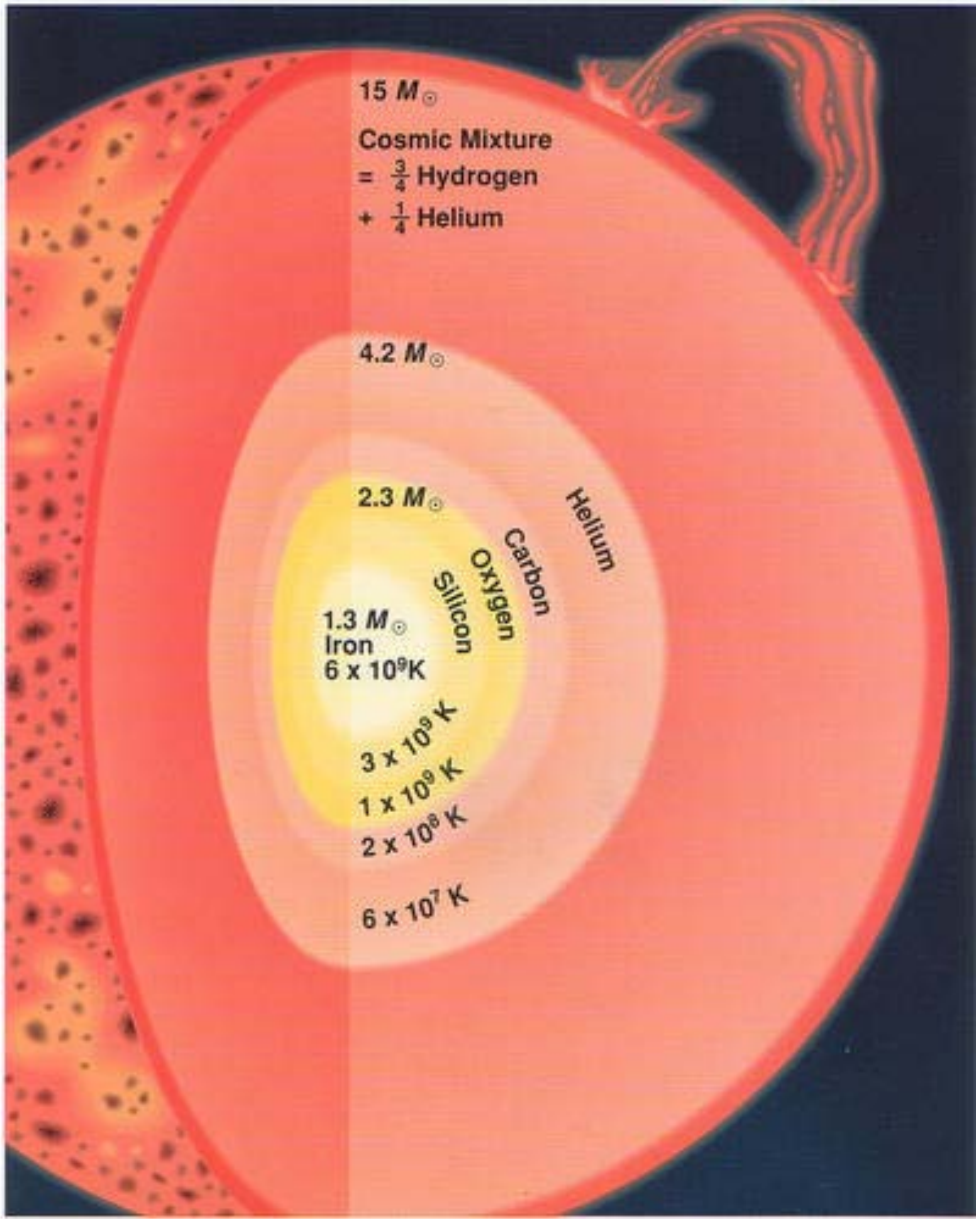
Astronomy in the News? End of Ramadan last Friday, September 10, marked by crescent Moon.

Pic of the Day – Milky Way Galaxy and

Zodiacal light from dust in Solar System

Goal

To understand how a massive star gets from hydrogen to iron, and why iron?



Origin of Type II, Ib. Ic

How does a massive star get from hydrogen to iron, and why iron, and what then?

Discussion point:

What do you know about iron?

Evolution - gravity vs. charge repulsion
§ 2.1

Discussion point: Why do you have to heat a fuel to burn it?

H → He → C → O
more protons, more charge repulsion, must get ever hotter to burn ever "heavier" fuel

Just what massive stars do!
Support by thermal pressure.
When fuel runs out, core tries to cool but gravity squeezes, core contracts and HEATS UP
overcomes higher charge repulsion, burns new, heavier fuel, ***until get to iron***

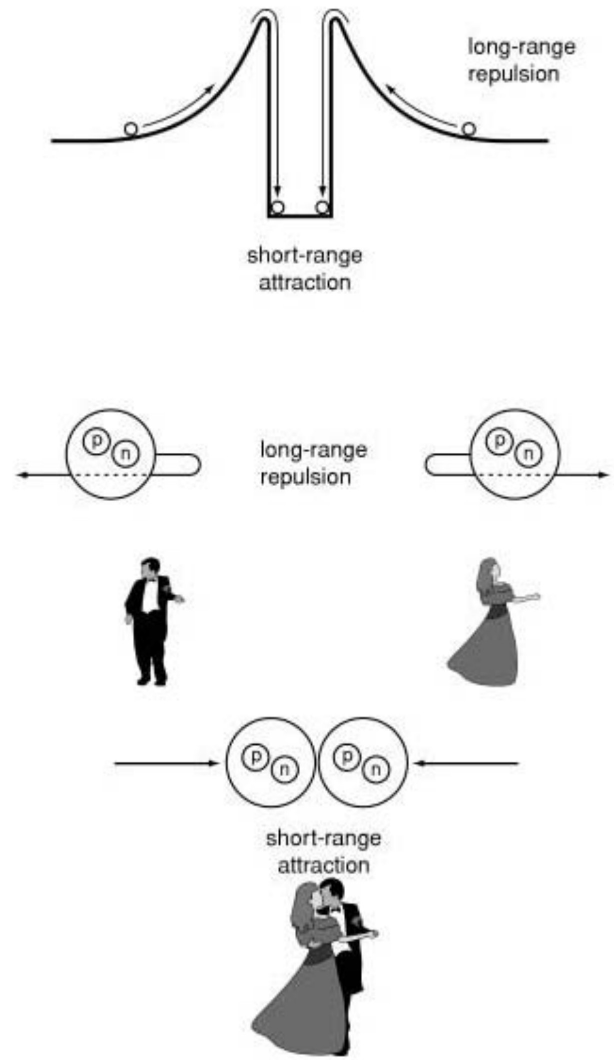


Figure 2.1

Make succession of heavier elements

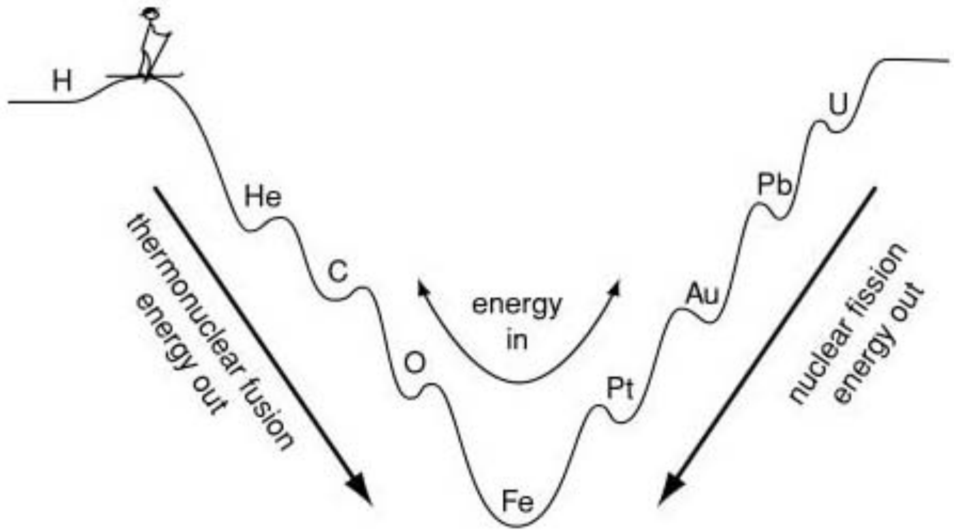


Figure 2.3

Special role of Iron - 26p, 30n

Endothermic - must put energy in to break iron apart into lighter elements or to forge heavier elements, absorb energy, lower pressure, core contracts, absorb more energy, more contraction…

=> The iron core quickly collapses! Catastrophic death of the star.

Goal

To understand what happens after a massive star forms an iron core

When iron core forms - star is doomed to collapse, form a neutron star (or maybe a black hole), composed essentially of all neutrons.

$p + e \rightarrow n + \nu$ ***neutrino***,

Action of Weak Nuclear Force (Chapter 1.2)

One ν is generated for every p that is converted, a star's worth of protons

$\Rightarrow$***lots of neutrinos***

$\Rightarrow$99% of energy of collapse is carried off by neutrinos (Ch 1.2, 2.1, 2.2)

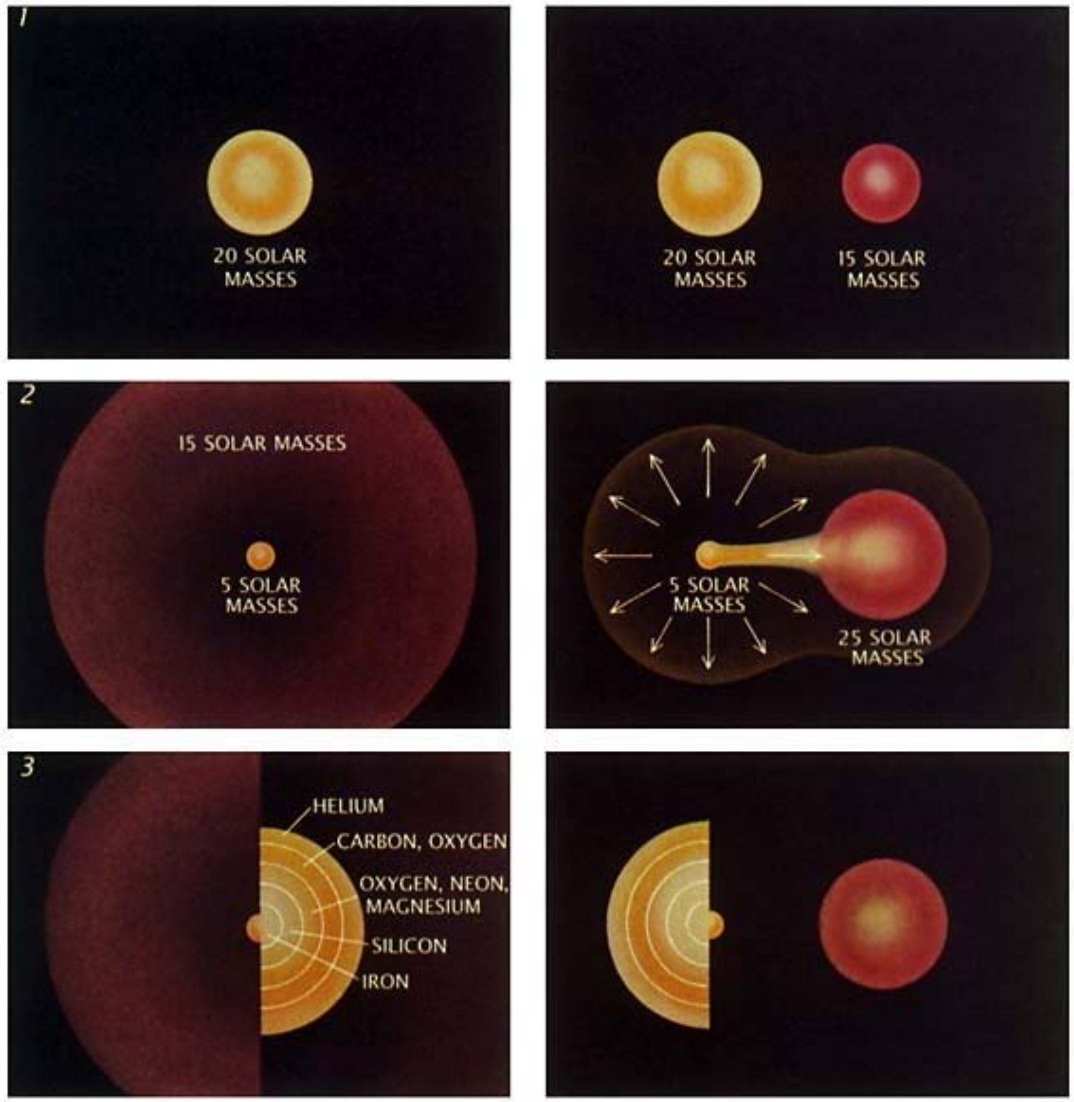
Goal

To understand how the iron core process works in Type II, Type Ib, and Type Ic supernovae.

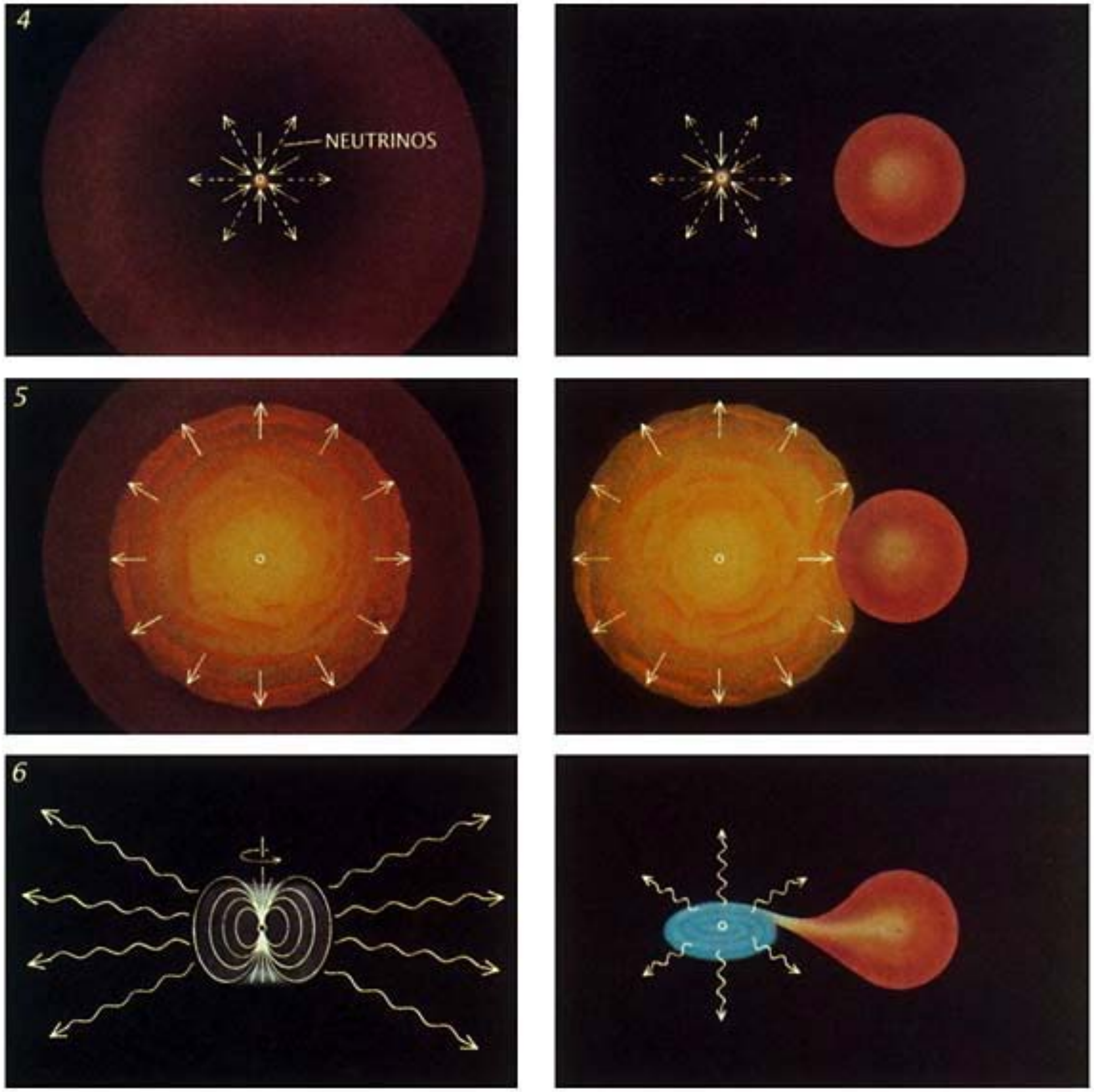
To understand how they are alike and why and how are they different.

Single star: Type II   Same star in binary: Type Ib/c

Same evolution inside star, thermal pressure, regulated burning, shells of heavier elements, whether envelope there or not



Rotating, magnetic radio pulsar.



Neutron star in binary system, X-ray source