Wednesday, February 10, 2016

Grades posted. Key posted.

Exams, Sky Watch returned

Astronomy in the news?

Likely to be HUGE news on Thursday!

My email still burning with news of new supernova in nearby galaxy Centaurus A. Now officially named SN 2016adj.

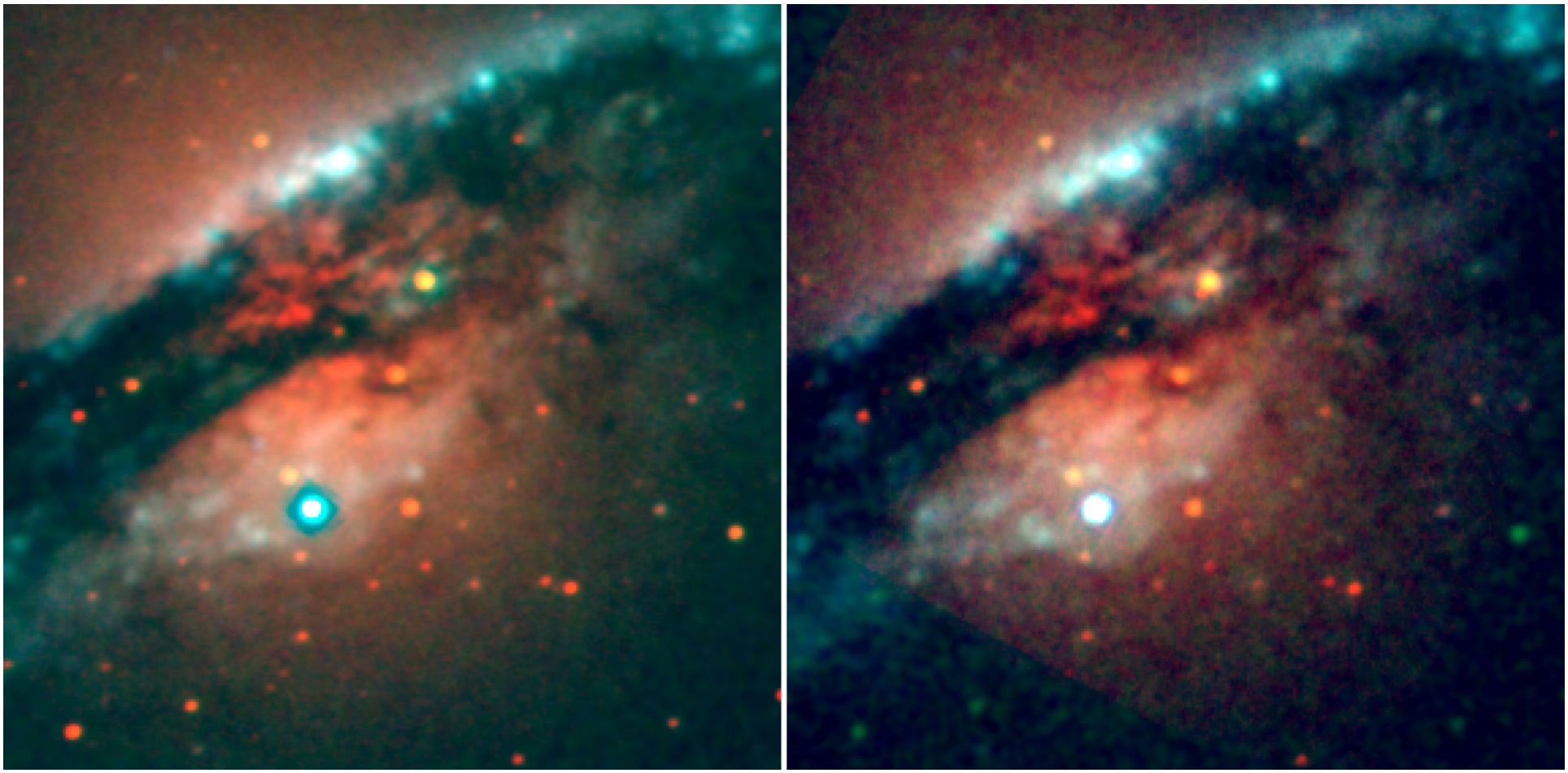
optical

radio

View of SN 2016adj from orbiting Swift satellite
(optical, UV, X-ray, gamma-ray)

Before

After



Sky Watch Targets

Binary Stars

Sirius, if you have not already done it.

Algol, Beta Persei in Perseus

Antares, Alpha Scorpii in Scorpius

Beta Lyrae in Lyra

Rigel, Beta Orionis in Orion (triple star system)

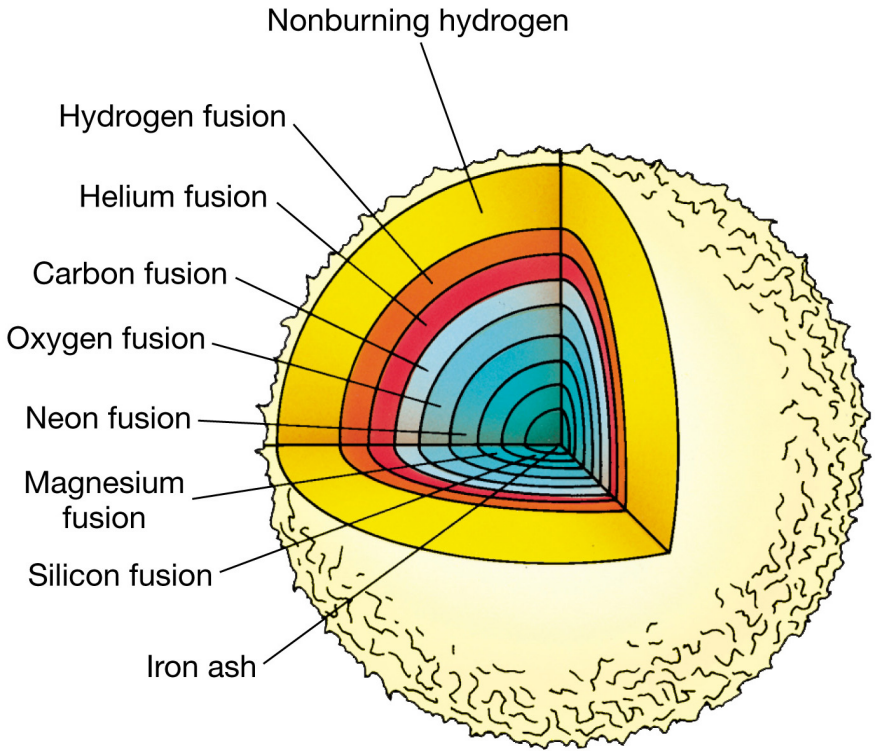
Spica in Virgo

Other binary star systems

Goal: to understand the origin of Type II, Ib, Ic

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

Reading: Chapter 1, Section 2.1 (forces, neutrinos), Chapter 2, Section 2.1, 2.4, 2.5, Chapter 6, Sections 6.4, 6.5 (jets, but not polarization), Betelgeuse interlude, end of Chapter 6.



Nuclear physics:

Protons and neutrons attract each other.

The **strong nuclear force** (Section 1.2.1) binds protons and neutrons together in atomic nuclei.

Short range force, acts only when protons and neutrons are nearly touching.

Protons have positive electrical charge. They repel one another at large distances.

The strong nuclear force can, and does overwhelm the charge repulsion if the protons and neutrons are close enough together.

Evolution of Stars - 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 loses energy**, but gravity squeezes, core contracts and HEATS UP
overcomes higher charge repulsion, burns new, heavier fuel, ***until get to iron***

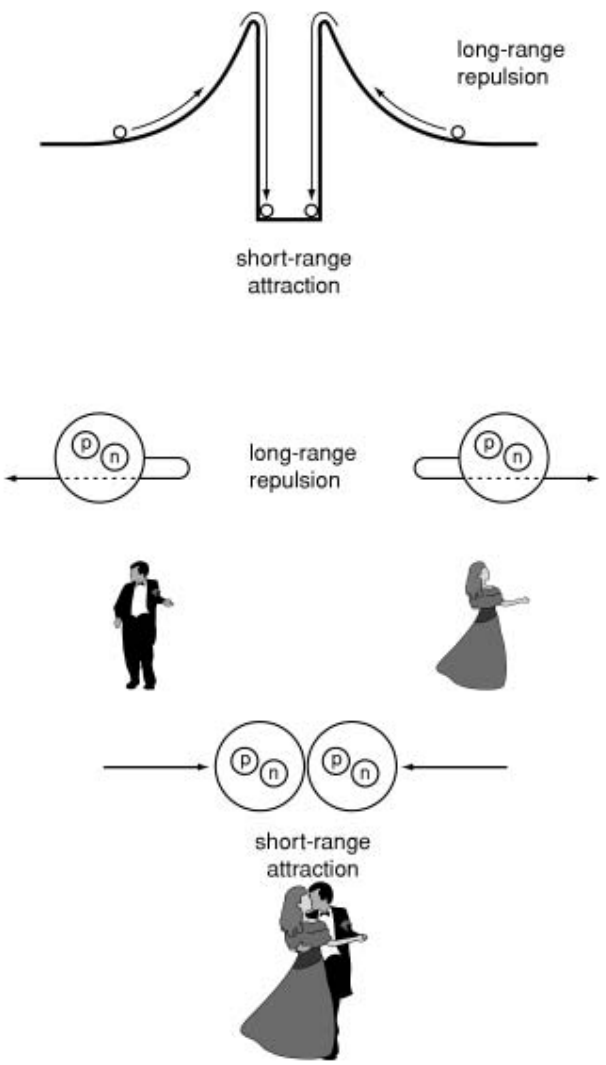


Figure 2.1

Massive stars make a succession of heavier elements

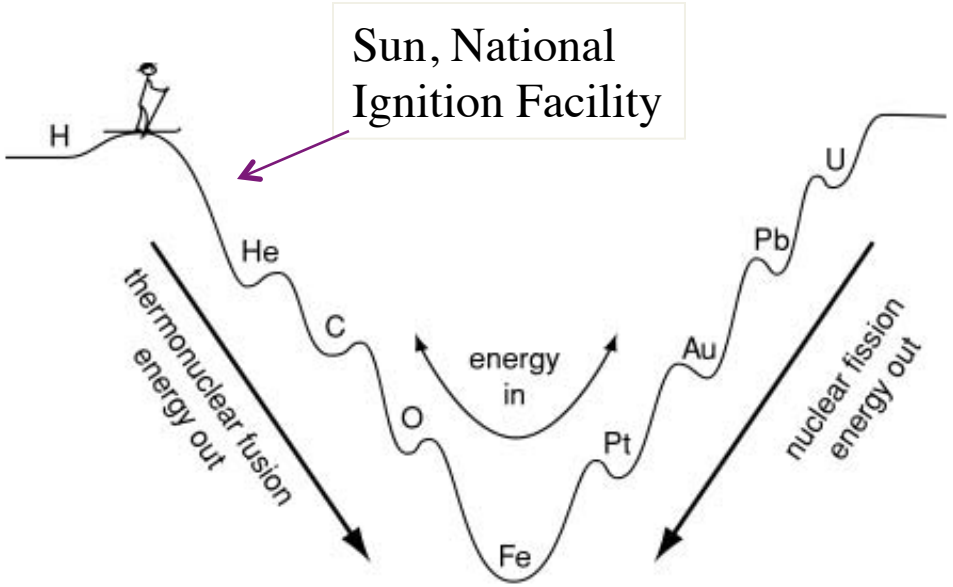


Figure 2.3 measure of binding energy of protons and neutrons in the atomic nucleus

Special role of Iron - 26p, 30n, most tightly bound arrangement of protons and neutrons.

Endothermic - must put energy in to break iron apart into lighter elements or to forge heavier elements. Irons absorbs energy, lowers pressure, core contracts, iron absorbs more energy, more contraction…

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