

March 3, 2010

Exam, key posted. Sky watch posted today, returned Friday.
Issue with question on radiation from inner portion of accretion disk,
c. UV or d. X-ray (#27 on A, 28, on B) accept either as correct. See
astronomy in the news.

Reading Chapter 7, Chapter 8 - Sections 8.1, 8.2, 8.5, 8.6, 8.10

Astronomy in the News? X-rays from progenitors of Type Ia
supernovae. Pluto on Nova. Effect of Chilean earthquake on rotation of
Earth.

Pic of the Day - International Space
Station from departing Space Shuttle
Endeavour.



Astronomy in the News

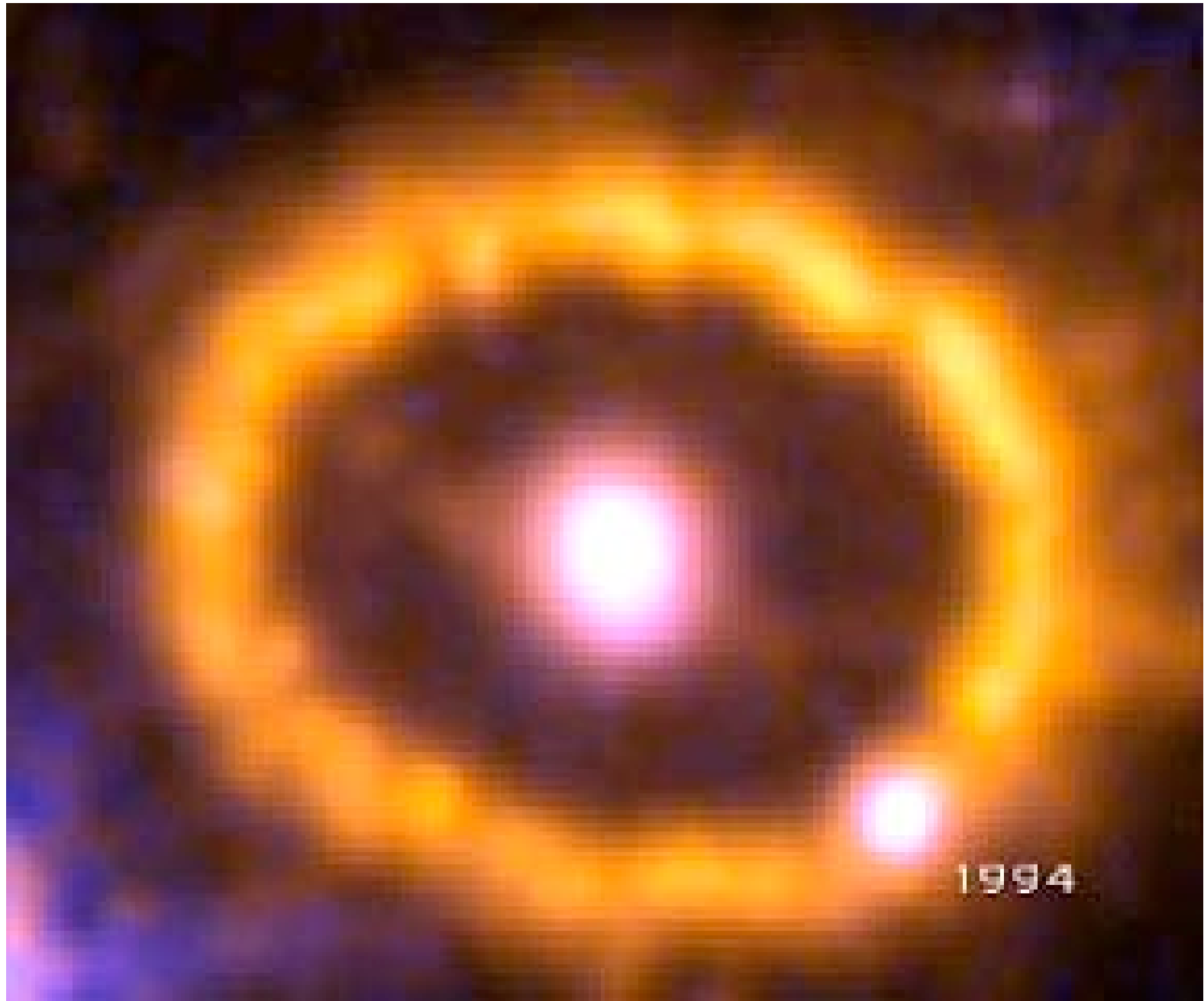
X-ray from progenitors of Type Ia supernovae. X-rays from burning on surface of white dwarf, not accretion disk. Rule out only 1 type of cataclysmic variable, not, for instance recurrent novae which only produce strong X-rays during burst events, like U Sco recently.

Nova program last night (and repeats?) on the nature of Pluto (Plutoid? Dwarf planet?) featuring two Texas grads, Neil de Grasse Tyson and Alan Stern. Very nice discussion of understanding Pluto in the context of what we have learned of the Kuiper belt, outer solar system.

NASA estimate that Chile earthquake rearranged mass of Earth, shifted orientation of Earth's axis by 3 inches, shortened day by microsecond. Report on NPR this morning, such shifts happen often, no measurable effect of the earthquake. Ice melting for last 12,000 shifts axis by an inch every year.

Goal:

To understand the nature and importance of SN 1987A for our understanding of massive star evolution and iron core collapse.



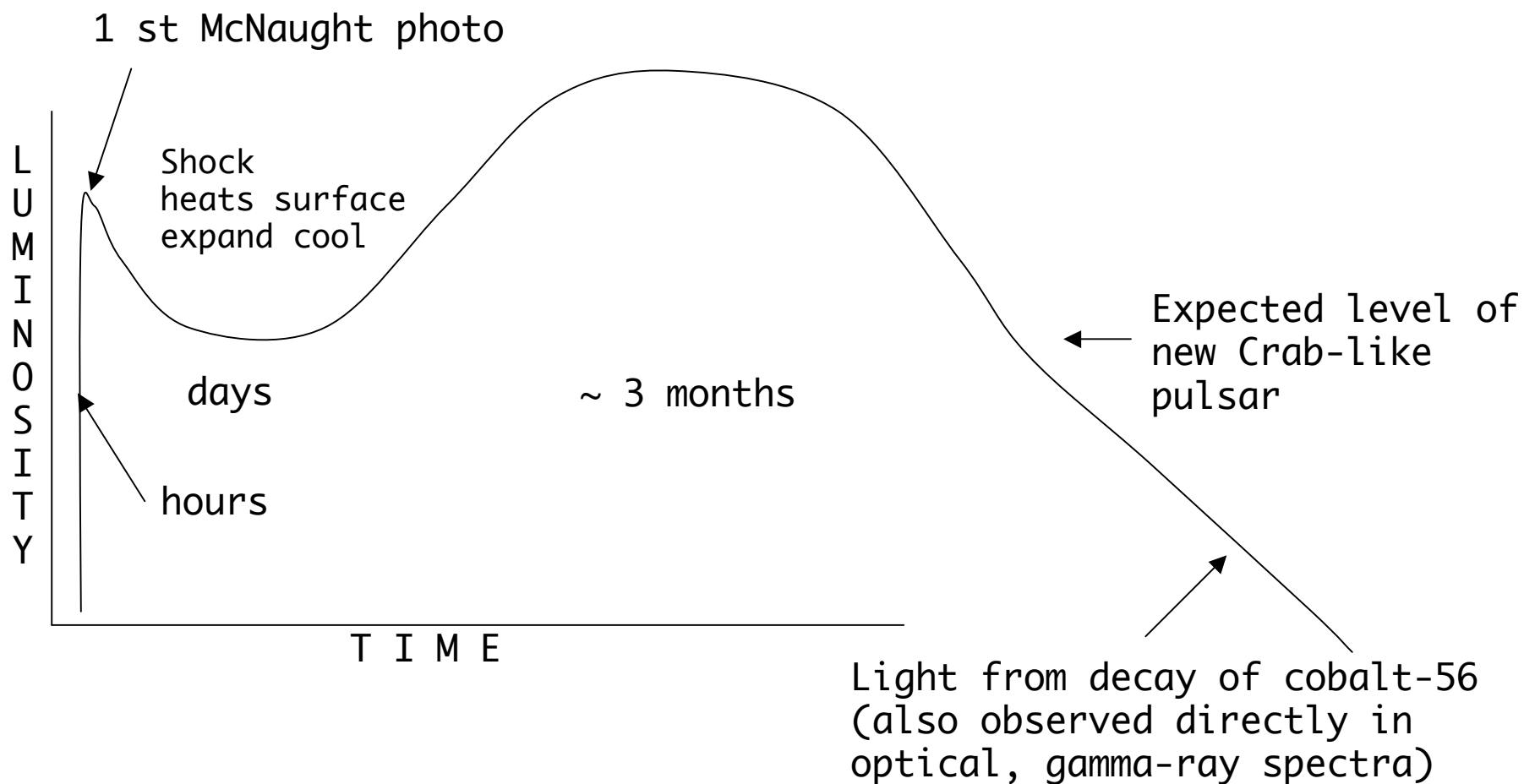
The single most important thing about SN 1987A is that we detected the neutrinos!

It was definitely a core-collapse event

10^{57} neutrinos emitted, most missed the Earth. Of those that hit the Earth, most passed through since neutrinos scarcely interact.

About 19 neutrinos were detected in a 10 second burst.

170,000 year history!



SN 1987A had a rather peculiar light curve because it was a relatively compact blue supergiant, not a red supergiant, brief shock heating, rapid cooling by expansion, no plateau, subsequent light all from radioactive decay

Neutrinos from SN 1987A proved a neutron star formed and lasted for at least 10 seconds while neutrinos were detected - where is it?

Expected to see it in ~ 1 year - still looking 23 years later

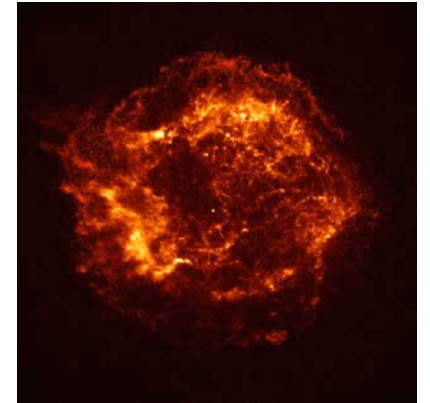
Any neutron star is dimmer by at least a factor of 10 than the 1000 year-old Crab pulsar

If similar to central object in Cas A, much too dim to detect, 100 to 1000 \times dimmer than Crab pulsar

Possibly black hole, not neutron star??

Don't know. Can't rule out.

Neutron star could be “hidden,” by dust, or be a slow rotator, or with a weak magnetic field (but counter to notion of jet - some evidence for jet), or a very strong magnetic field that would radiate and slow it down quickly.



One Minute Exam

What was the most important thing about SN 1987A in terms of the basic physics of core collapse?

➡ It exploded in a blue, not a red supergiant

← It was surrounded by a ring

↑ It produced radioactive nickel and cobalt

↓ Neutrinos were detected from it