10/17/07

Exam 2, Chapters 6, 7, **This Friday**

Review sheet posted this afternoon

Review session **Thursday** 5 PM RLM 4.102 [NOTE different room than help sessions].

Net Sky Watch report due on Monday

Wheeler on travel Monday - Film on black holes

Astronomy in the News -
yesterday's pic SN 2005af

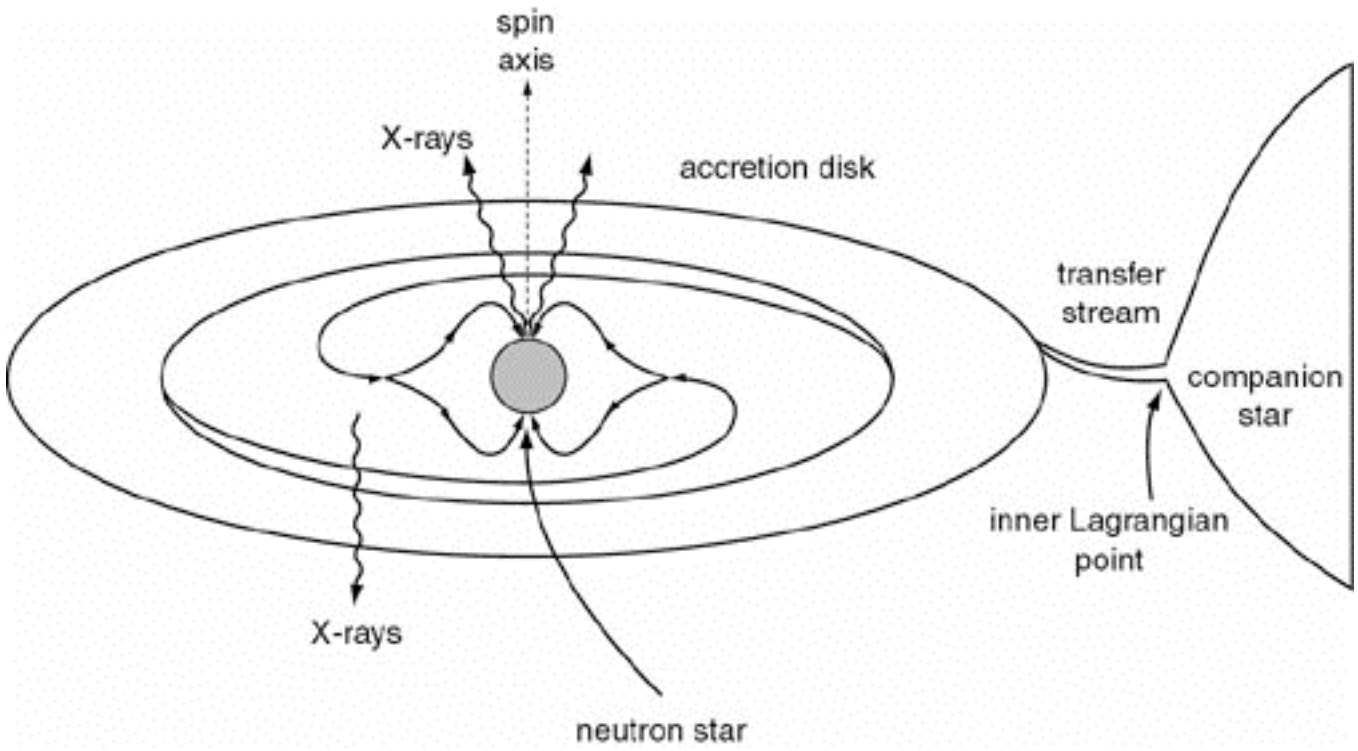
Pic of the day - I Zwicky 18, mix
of old and new stars

Reading

Chapter 8

Sections 8.1, 8.2, 8.5, 8.6, 8.7, 8.10

Figure 8.2



Some neutron stars are in binary systems, they accrete mass through an accretion disk and produce ***X-rays***.

Accretion onto tilted magnetic poles can give pulses of X-rays by "lighthouse" mechanism

X-ray Transients - flare every few years for a month or so: suspect ***disk instability*** like ***dwarf novae,*** but neutron star, not white dwarf.

X-ray Bursters - rise in about a second, decay in a minute, no "pulses," suspect low magnetic fields, Repeat in hours to months.

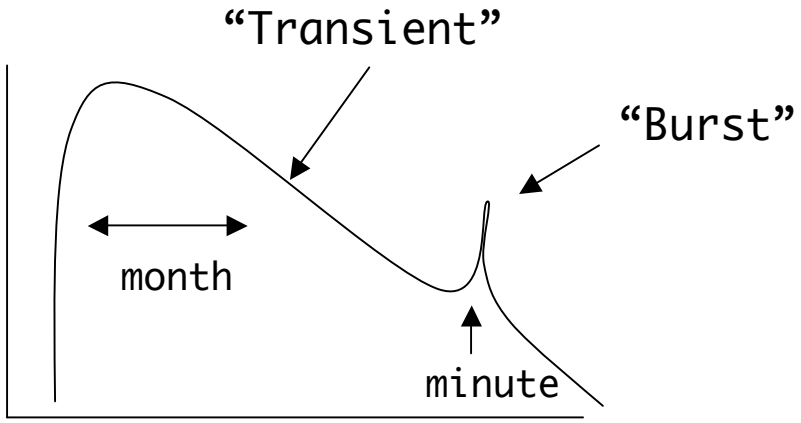
Analog of ***classical novae,*** thermonuclear burning on surface of neutron star not white dwarf

H is *thermally supported* - regulated burning H → He

He, high density, *quantum pressure* - unregulated → ***flash!***

little matter expelled because of high gravity

One Case
Both
Phenomena



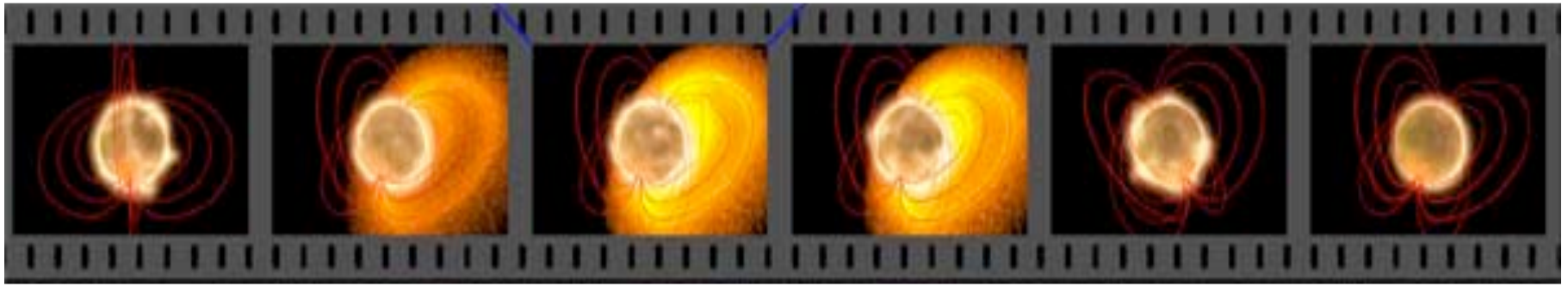
Soft Gamma Ray Repeaters - 4 known

One flared in the Large Magellanic Cloud galaxy, energy arrived in March 5, 1979.

Another flared in our Galaxy, energy arrived August 27, 1998, caused aurorae from 1000's of light years away.

Yet another flared in our Galaxy with energy arriving December 27, 2004, from the far side of the Galactic center, perhaps 10's of 1000's of light years away, brightest release of energy ever seen in the Galaxy, 100 times more powerful than August 1998 burst.

Magnetic eruption in neutron star [not necessarily in binary system.]



Theory - break patch of iron-like "crust" of neutron star, convert magnetic energy to heat (1998 burst) or completely rearrange magnetic field configuration (2004 burst).

Require "wiggling" of very strong magnetic fields, 100 × Crab pulsar

$\Rightarrow$ ***Magnetar*** - very highly magnetic pulsar.

Origin of magnetars compared to normal pulsars not yet known.

Formation might be related to hypernovae or Gamma-ray bursts (Chapter 11).

X-ray, Gamma-ray satellites should see many of these brightest bursts (December 27) in distant galaxies.

One Minute Exam

Which statement is most relevant to making a radio pulsar?

A) A solitary neutron star rotates with a tilted magnetic field.

B) A neutron star with an unstable accretion disk accretes matter from a binary companion.

C) A neutron star with a tilted magnetic field accretes matter from a binary companion.

D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

One Minute Exam

Which statement is most relevant to making an X-ray pulsar?

A) A solitary neutron star rotates with a tilted magnetic field.

B) A neutron star with an unstable accretion disk accretes matter from a binary companion.

C) A neutron star with a tilted magnetic field accretes matter from a binary companion.

D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

One Minute Exam

Which statement is most relevant to making an X-ray transient?

A) A solitary neutron star rotates with a tilted magnetic field.

B) A neutron star with an unstable accretion disk accretes matter from a binary companion.

C) A neutron star accretes a layer of helium supported by quantum pressure.

D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

One Minute Exam

Which statement is most relevant to making an X-ray burster?

A) A solitary neutron star rotates with a tilted magnetic field.

B) A neutron star with an unstable accretion disk accretes matter from a binary companion.

C) A neutron star accretes a layer of helium supported by quantum pressure.

D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

One Minute Exam

Which statement is most relevant to making a soft gamma-ray repeater outburst?

A) A solitary neutron star rotates with a tilted magnetic field.

B) A neutron star with an unstable accretion disk accretes matter from a binary companion.

C) A neutron star accretes a layer of helium supported by quantum pressure.

D) A neutron star has a magnetic field 100 times stronger than the pulsar in the Crab nebula.

New Topic: Black Holes

Chapter 9

What do you know about them -- When did you learn?