3/28/05

3/21 Chapter 6, Sections 5, 6

3/23 Chapter 7, Chapter 8, Sections 1, 2 (skip Sections 4, 5)

3/25 Chapter 8, Sections 6, 7 (skip Sections 8, 9) Section 10.

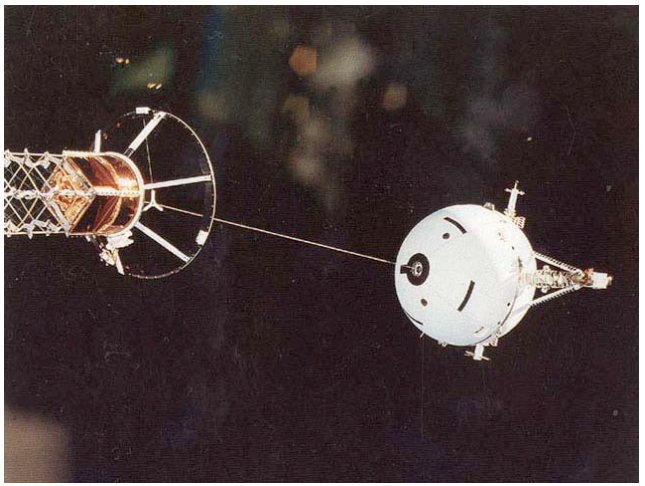
Today, start Chapter 9.

Extra credit hint: Jupiter is currently in Virgo; the Moon will be in Taurus April 11, 12

News:

Pic of the day

Space tether

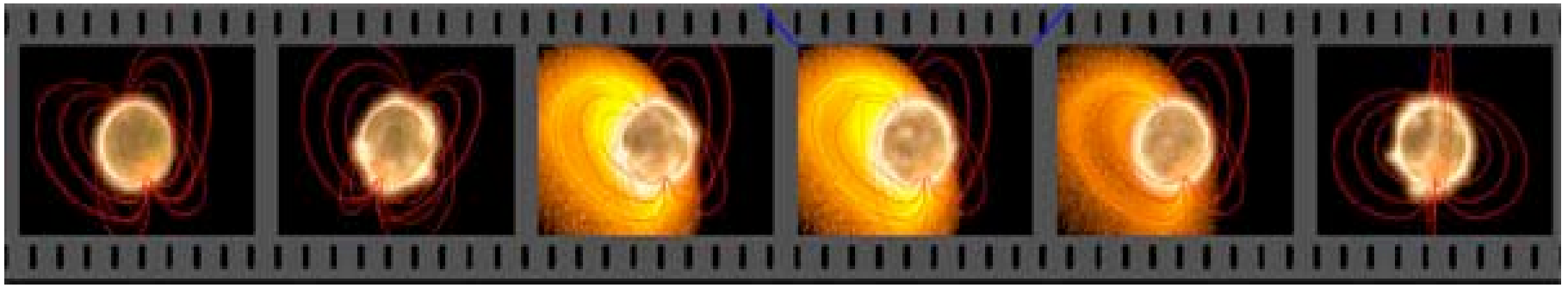


Soft Gamma Ray Repeaters - 4 known

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 just last December 27, 2004, on 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.



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, $100 \times$ Crab pulsar

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

Origin not yet known.

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

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

New Topic: Black Holes

Chapters 9

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

Black Hole bumper sticker, comic,

Film

Black Holes

Mitchell, Laplace, late 18th Century: with Newton's Gravity
could have escape velocity greater than the speed of light =>
light could not get out, completely dark, *corps obscurs*.

Now know Newton was wrong.

Excellent approximation for weak gravity - "true" in that case

Conceptual problems $F = \frac{G M_1 M_2}{r^2}$

infinite force for zero separation (in physics infinity
$\Rightarrow$ problem)

instantaneous reaction => infinite speed of gravity

Experiment - wrong deflection of light.

Need Einstein and more!

Great conceptual differences between Newton and Einstein

Newton - Force between two objects

Einstein - Mass curves space, objects move *with no force* in curved space

Need to explore curved space - use geometry in multiple dimensions

SPACE - *The Final Frontier*

Dimensions - defined by the number of mutually perpendicular directions

0 D - point

1 D - line

2 D - area

3 D - volume (secret hand sign)

4 D - ?