## 2/13/08

Sky watch reports back Friday

Astronomy in the news?

Special lecture, "The Possibility of Life Elsewhere in the Universe" next Wednesday, Feb 20, 7:30 PM - extra credit for attendance.

Pic of the Day - elliptical galaxy







Maximum mass of a neutron star is 1.5 to 2 solar masses

New-born neutron star over compresses and rebounds - potential mechanism for explosion,

DOES NOT WORK!

Rock in stream standing bow wave outer core material free-falls inward hot shocked matter falls on neutron star shock halts at some distance from neutron star hot new neutron star

Form *standing shock*, and outer material just continues to fall in, pass through shock front and settle onto the neutron star.

## Perhaps the neutron star can boil out neutrinos at a higher rate...

Possible, but still not proven,

A bit like boiling a pot on the stove, the steam comes out, but lid just rattles, it does not explode to the ceiling.

 $h^{(1)} = \left( \begin{array}{c} sh^{(1)} \\ h^{(1)} \\ h^{(1)} \\ h^{(1)} \end{array} \right) = \left( \begin{array}{c} sh^{(1)} \\ h^{(1)} \\ h$ slanding shock some neutrinos deposit their energy behind boiling the shock. boiling neutron star carries neutrinos N out of trapped region. Son neutrinos trapped neutrinos stream freely (V) (V)

May need a new idea...

One Minute Exam

Most of the energy liberated in the formation of a neutron star is emitted in the form of:

A) Neutrons

B) Protons

C) Neutrinos

D) Photons

## New possibility - Jet-induced supernova (Ch 6, p. 94)



Crab Nebula

Cassiopeiae A

SN 1987A

Are jet-like flows typical? Are they important?

What is the shape of a routine, extragalactic, core collapse supernova?

Ball, Football, Frisbee?

How do you measure that for a distant supernova that only appears as a dot of light in even the most powerful telescopes?

*Polarization* - orientation of the electric component of the electromagnetic waves (light) that comes from the surface of the star.



Polarization = 0: intensity the same in orthogonal directions, photosphere is circularly symmetric, supernova is spherically symmetric (or special viewing angle)



P ≠ 0: intensity different in orthogonal directions, photosphere is not circularly symmetric, *supernova is asymmetric* 





One Minute Exam

What happens to the *shock wave* produced when an iron core collapses to form a neutron star and bounces?

A It fades away

B) It propagates out through the star and causes an explosionC) It stalls at some distance from the neutron star

D) It traps neutrinos

Polarization studies (last 10 years) show that all Core Collapse Supernovae are out-of-round.

Perhaps combination football, frisbee, or something else.

They show shapes consistent with (but not necessarily proving) jet-like flow.

Calculations show jets emerging from newborn neutron star can explode the star, make it out-of-round.