

2/24/06

Books - Shipped next Tuesday!!!

Chapter 6 posted - revised, updated for second edition

Exam 2, Chapter 6, Week from today, Friday March 3,
review sheet next week
review Thursday, 5 PM RLM 4.102

News? New gamma-ray burst with associated
Type Ic supernova (in the direction of the
constellation Aries)

Pic of the day - Recurrent Nova RS Ophiuchi
(find constellation Ophiuchus in the early
morning sky)



Jet Movies

How to define a particular direction in space?

Rotation - rotation axis.

How to make a jet? Some variation on squeeze and squirt
(toothpaste mechanism)

Rotate magnetic neutron star, amplify the magnetic field, eject
mass if field is strong enough.

Magnetic lines of force, locus of equal field strength, act
somewhat like rubber bands, they are elastic and tend to rebound
if deformed and can be twisted and coiled.

Twisted magnetic fields have tension along them and exert
pressure sideways.

Magnetic jet movies, rubber band.

What jets do -

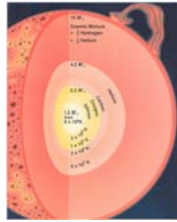
Bagel and breadstick, jet/torus shape “natural.”

Strong enough jet can explode the star, but neutrinos
probably also play a role - complicated problem!

Account qualitatively for out-of-round polarization.

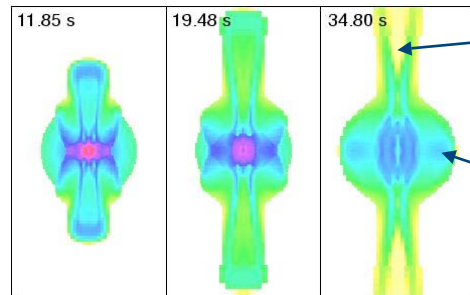
Test for shape (jet/torus), prediction of different
elements exploded in different directions.

Initially
spherical
model,



oxygen, silicon,
calcium, and iron
would be
exploded in all
directions

Axis/torus
structure



log(Density, g/cc)
0.6 2.1 3.6

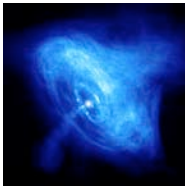
jet
“iron”
bread
stick
torus,
O, Ca,
bagel

One Minute Exam

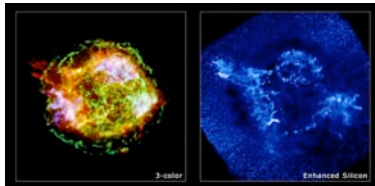
How do astronomers determine the shape of supernovae in distant galaxies

- A) Take a picture and look at the shape
- B) Measure the polarization of the light
- C) Measure the magnetic field of the supernova
- D) Measure the rotation of the supernova

Cautionary notes



Left over
jet/torus,
but did jet
cause the
supernova?



Why is
the jet
silicon
not iron?



What
orientation?