3/7/05

Test 2 Wednesday Chapter 6, Sections 1 - 4

Review Sheet posted

Review Session Tuesday, RLM 15.216B 6 - 7 PM

Wheeler available Monday, Tuesday, make an appointment, or drop by.

Friday - open discussion of class topics.

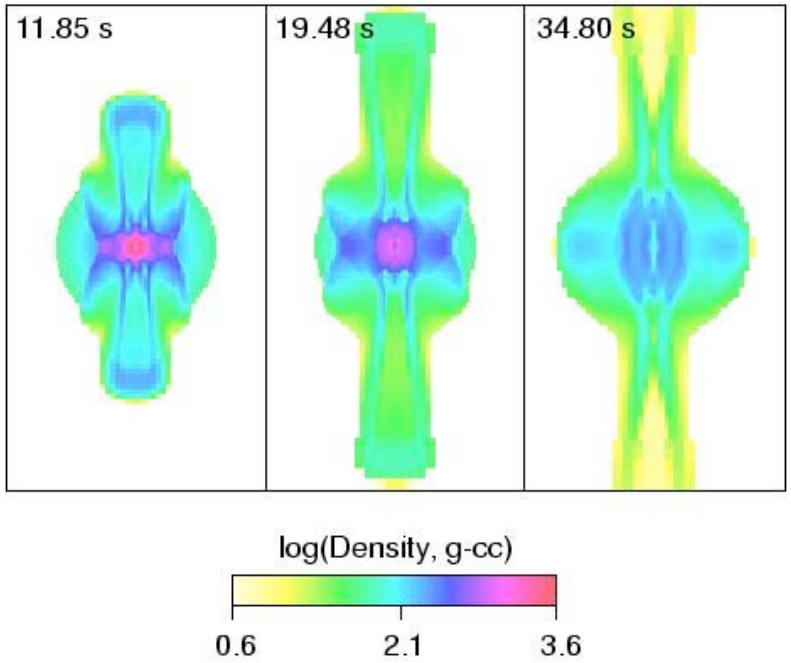
News? Brian Greene (Elegant Universe) at Barnes and Nobel Aboretum Wed, 7:30 PM, Simpsons?

Pic of the day - arc of Mercury

Polarization studies (last 5 years) show that all Core Collapse Supernovae are out-of-round.

They show shapes consistent with routine jet-like flow.

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



computer models predict a jet/torus structure

Khokhlov et al. 1999

These supernovae may be related to ***gamma-ray bursts***.

This is the first new idea to understand these supernovae in thirty years.

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 -

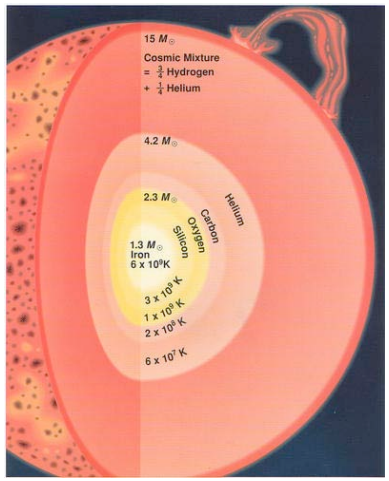
Bagel and breadstick, jet/torus shape “natural.”

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

Account qualitatively for out-of-round polarization.

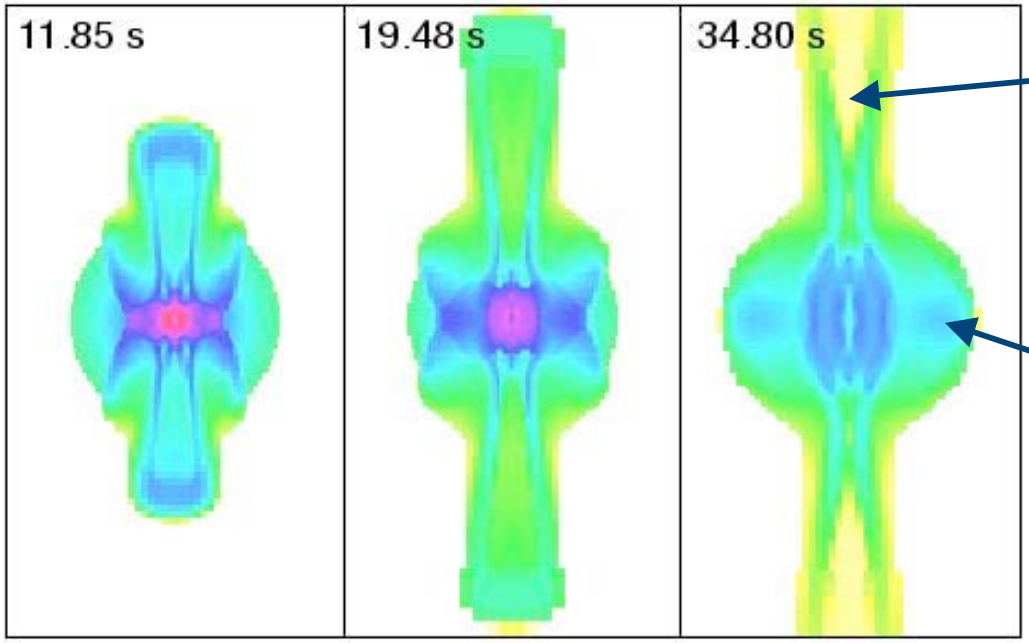
Test for shape (jet/torus), prediction of different elements exploded in different directions.

Initially spherical model,



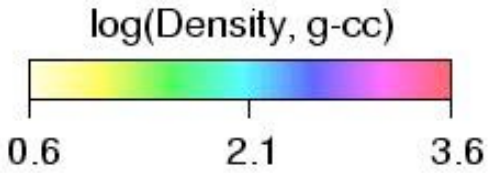
oxygen, silicon, calcium, and iron would be exploded in all directions

Axis/torus structure

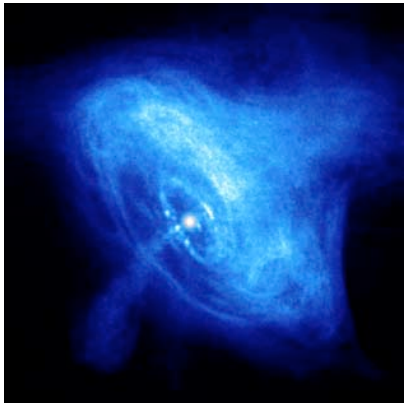


jet "iron" bread stick

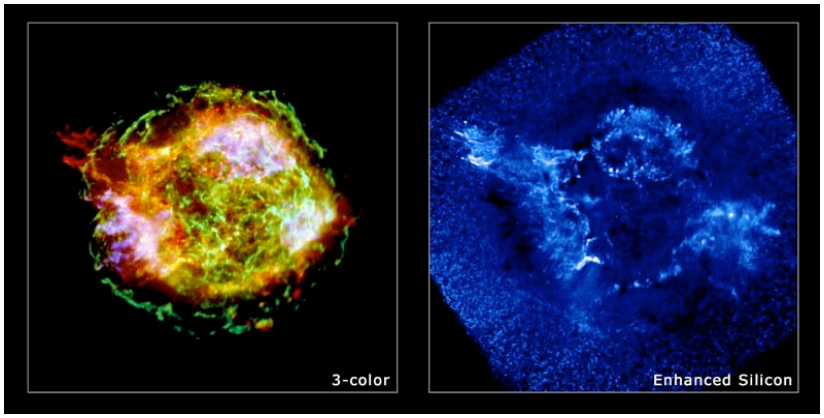
torus, O, Ca, bagel



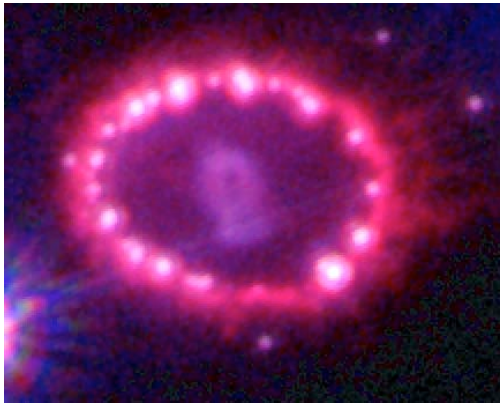
Cautionary notes



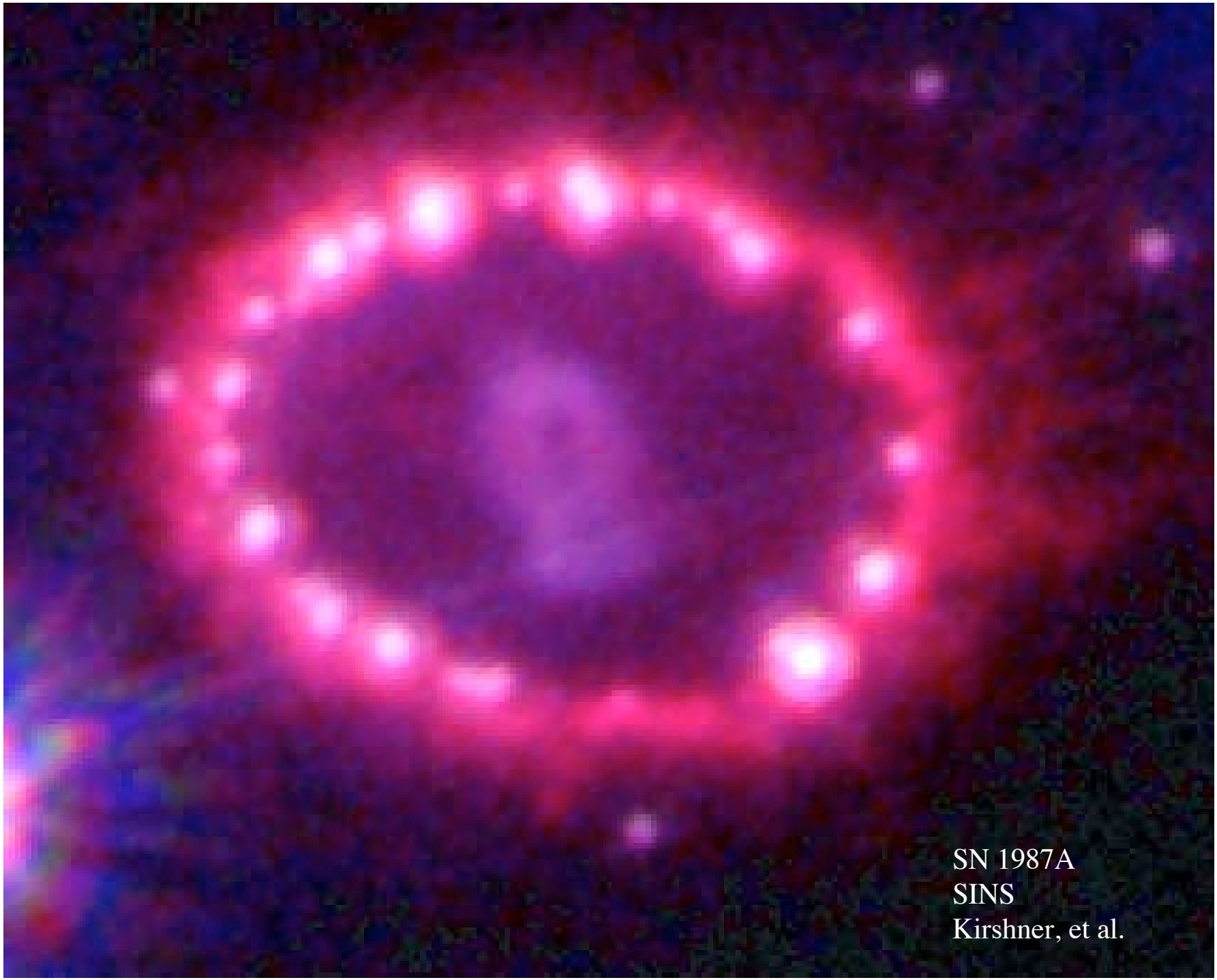
Left over jet/torus, but did jet cause the supernova?



Why is the jet silicon not iron?



What orientation?


SN 1987A
SINS
Kirshner, et al.