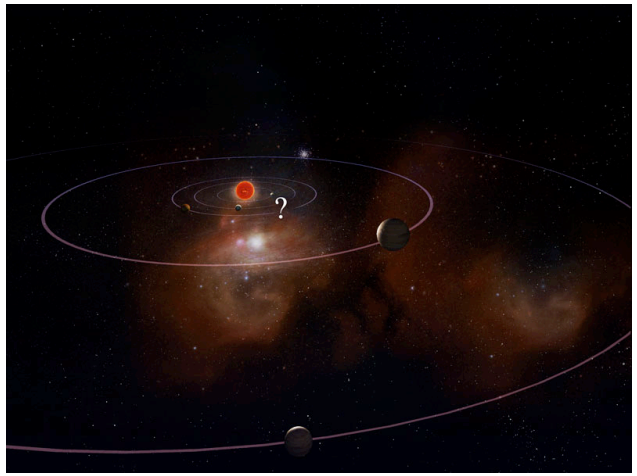
2/18/08

Astronomy in the news?

Special lecture, “The Possibility of Life Elsewhere in the Universe” Wednesday, Feb 20, 7:30 PM - 2 points extra credit for attendance, sign-up sheet at the McDonald Observatory table outside the lecture hall. Full lunar eclipse observing afterward (weather permitting).

Pic of the Day - solar systems like our own?



IntegrityUT™

Monday: Presidential Reception

Connelly Ballroom at 7pm with
Sherron Watkins, the Enron Whistleblower

Tuesday: Environmental Integrity

"Too Hot Not to Handle" Environmental documentary
Hogg Building (WCH) 1.120 5-7pm

Wednesday: Integrity Across Cultures

Dr. Gregory J. Vincent, VP for Diversity and
Community Engagement
Sangam Indian Dance, Ransom Notes, Latin Dance Group
San Jacinto MPR 7-9pm

Thursday: IntegrityUT and Beyond

Music by Texas Renegades and Free BBQ
Main Mall 5-7pm

SENATE Of College Councils

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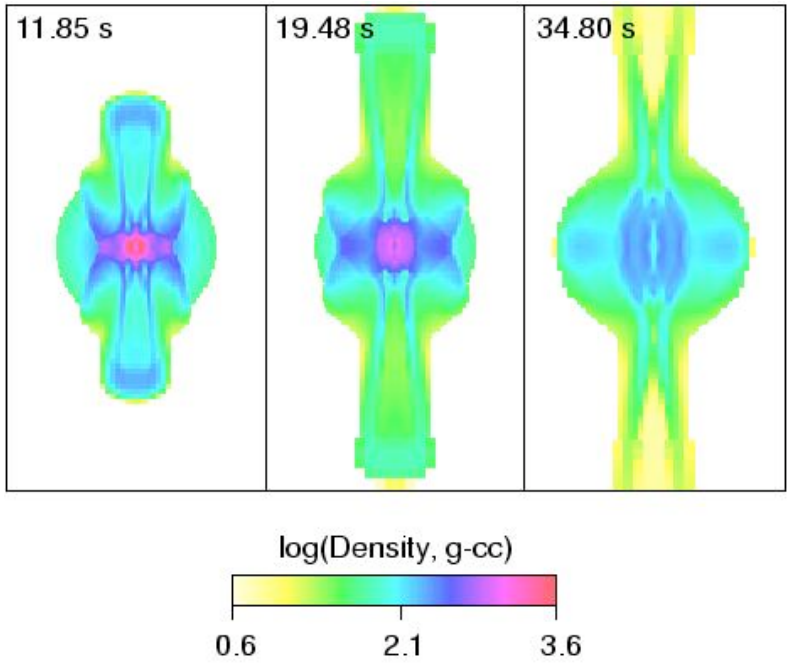
Polarization studies (last 10 years) show that all Core Collapse Supernovae are out-of-round.

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.

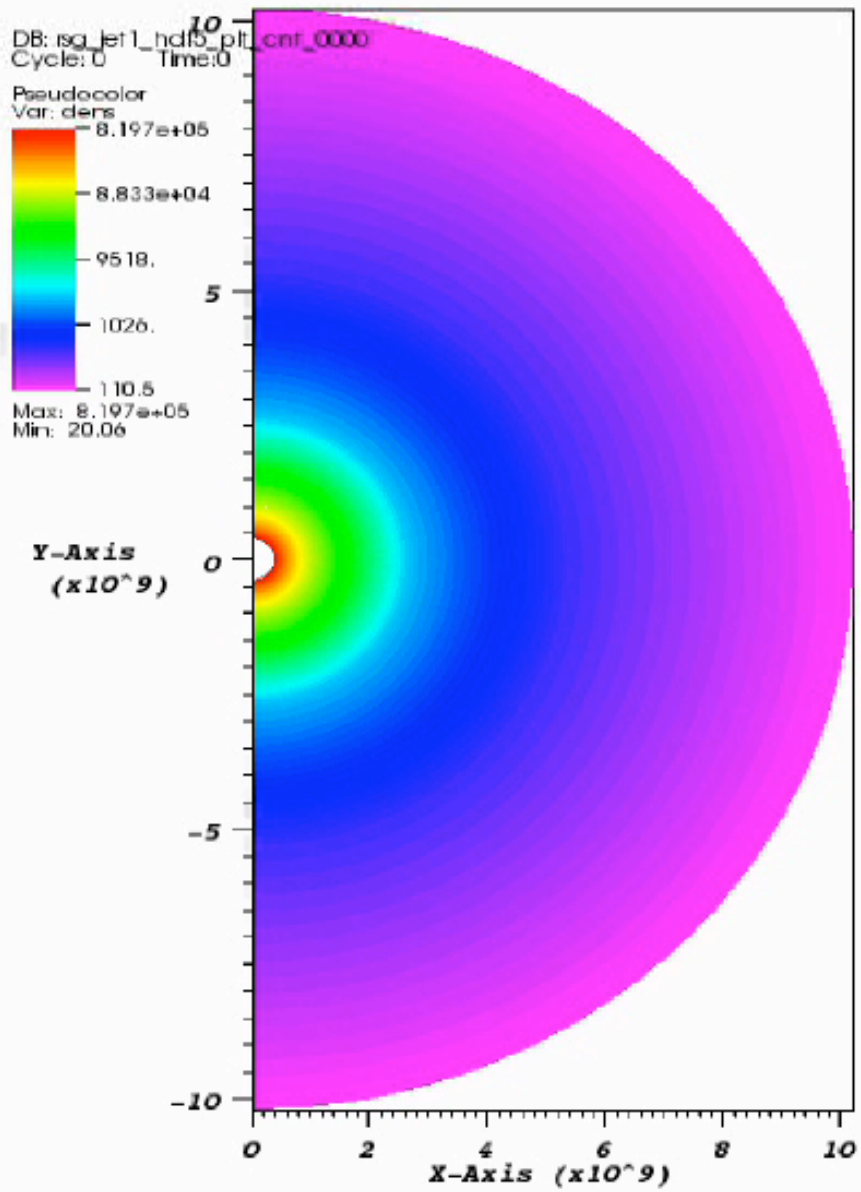


computer models predict a jet/torus structure

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.



Supercomputer simulation by Sean Couch

User: smc
Thu Feb 14 14:48:17 2008

What jets do -

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

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 and along the lines of force.

Rubber band - twist moves along the rubber band.

What jets do -

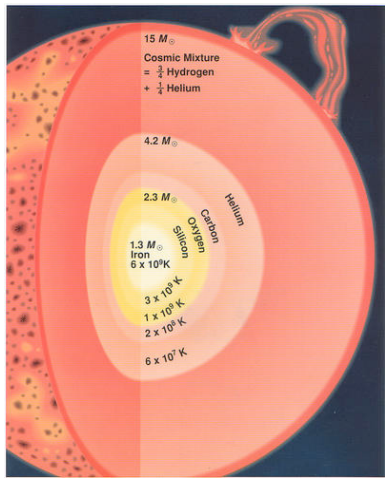
Bagel and breadstick, jet/torus shape “natural.”

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

Account qualitatively for out-of-round polarization.

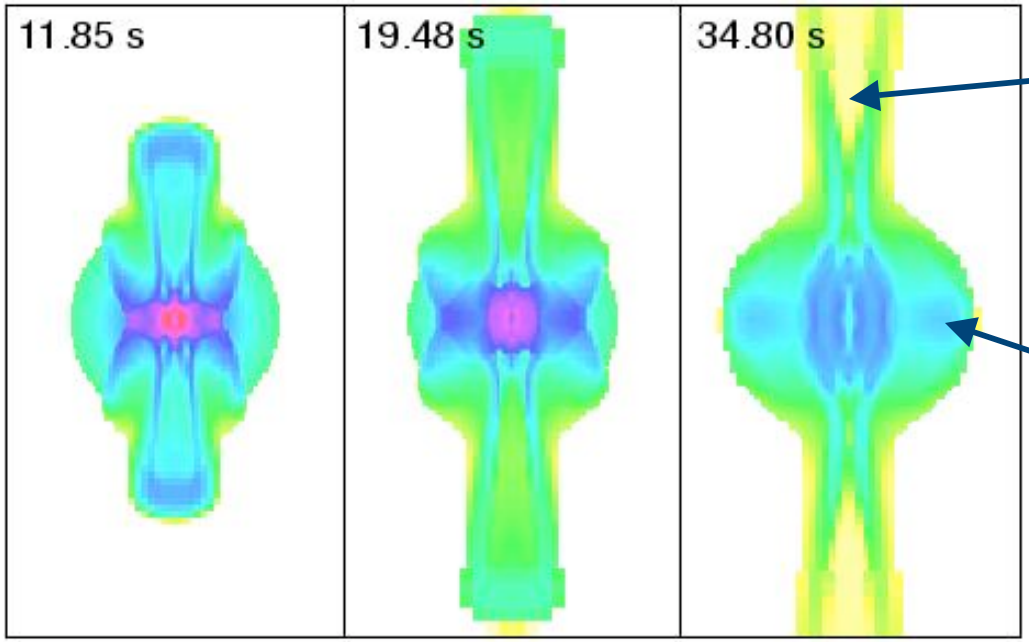
Test for shape (jet/torus), prediction of different elements exploded in different directions.

Initially spherical model,



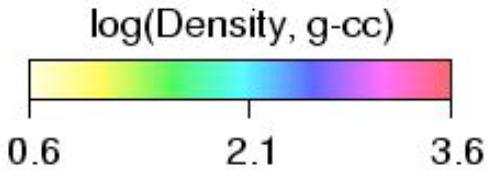
oxygen, silicon, calcium, and iron would be exploded in all directions

Axis/torus structure



jet
"iron"
bread
stick

torus,
O, Ca,
bagel



One Minute Exam

How do astronomers determine the shape of supernovae in distant galaxies

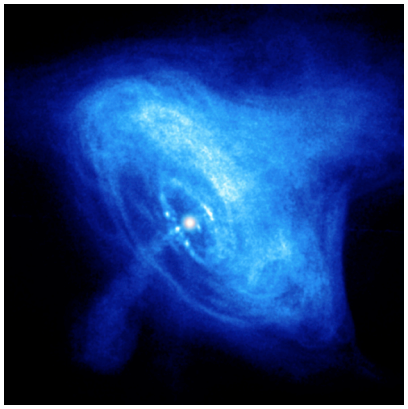
A) Take a picture and look at the shape

B) Measure the polarization of the light

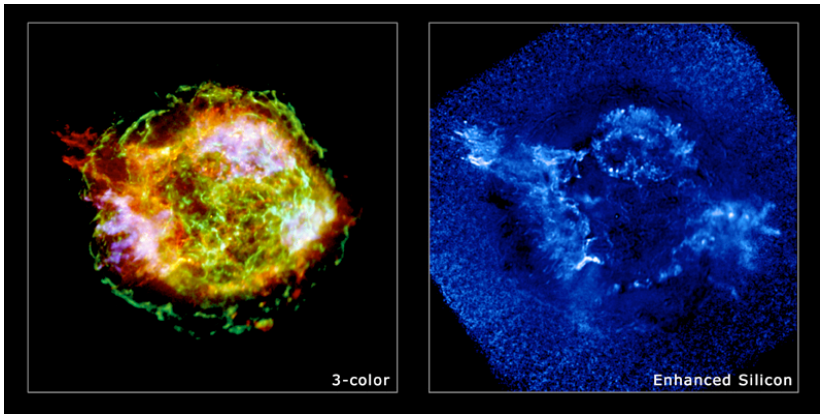
C) Measure the magnetic field of the supernova

D) Measure the rotation of the supernova

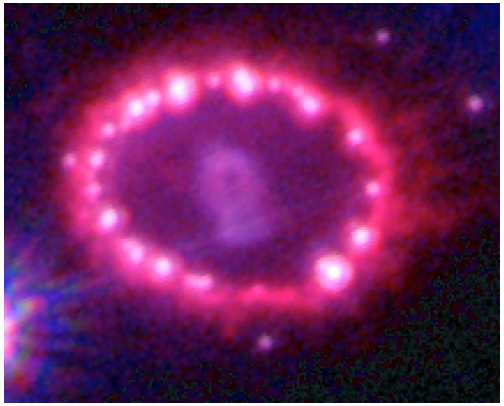
Cautionary notes



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



Why is the jet silicon not iron?



What orientation?