January 28, 2011

Typo of class website url on handout:

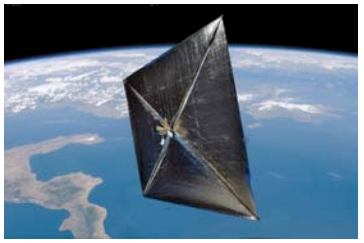
http://www.as.utexas.edu/astronomy/education/spring11/wheeler/309n.html

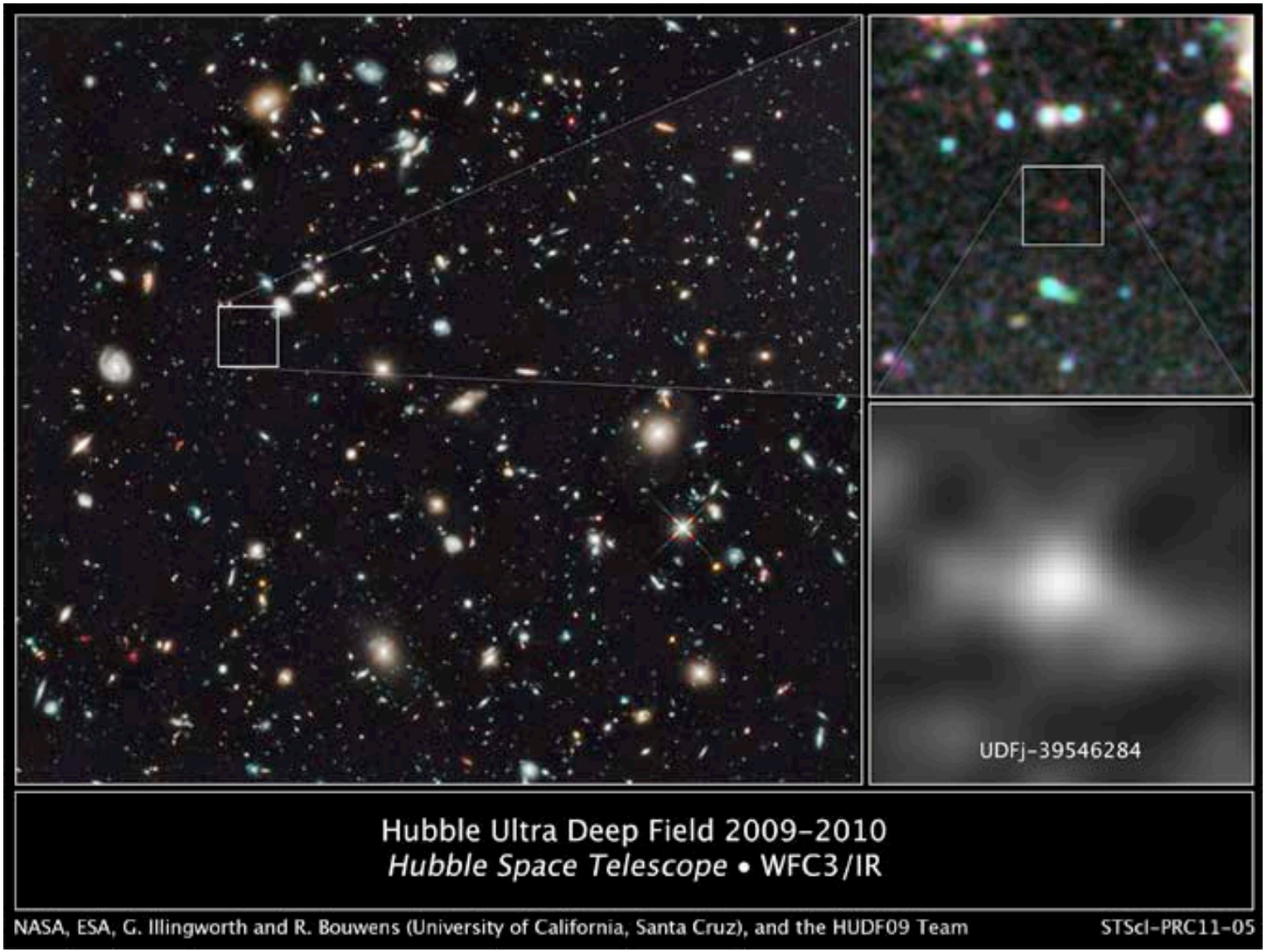
Astronomy in the news? John Mather, winner of Nobel Prize in Physics for study of cosmic background radiation, visiting department today. Chief Scientist for James Webb Space Telescope that will probe first stars and galaxies.

First of those seen faintly by Hubble Telescope, new record from 13.2 billion years ago, next slide.

25th anniversary of the explosion of the Space Shuttle Challenger, today

Pic of the day: proposed solar sail





Record earliest galaxy, 480 million years after birth of Big Bang, 13.2 billion years ago, 100 times less massive than Milky Way. First stars, galaxies born after cosmic Dark Ages

Chapter 6 Supernovae

Historical Supernovae - ***in our Milky Way Galaxy*** observed with naked eye over 2000 years especially by Chinese (preserved records), but also Japanese, Koreans, Arabs, Native Americans, finally Europeans.

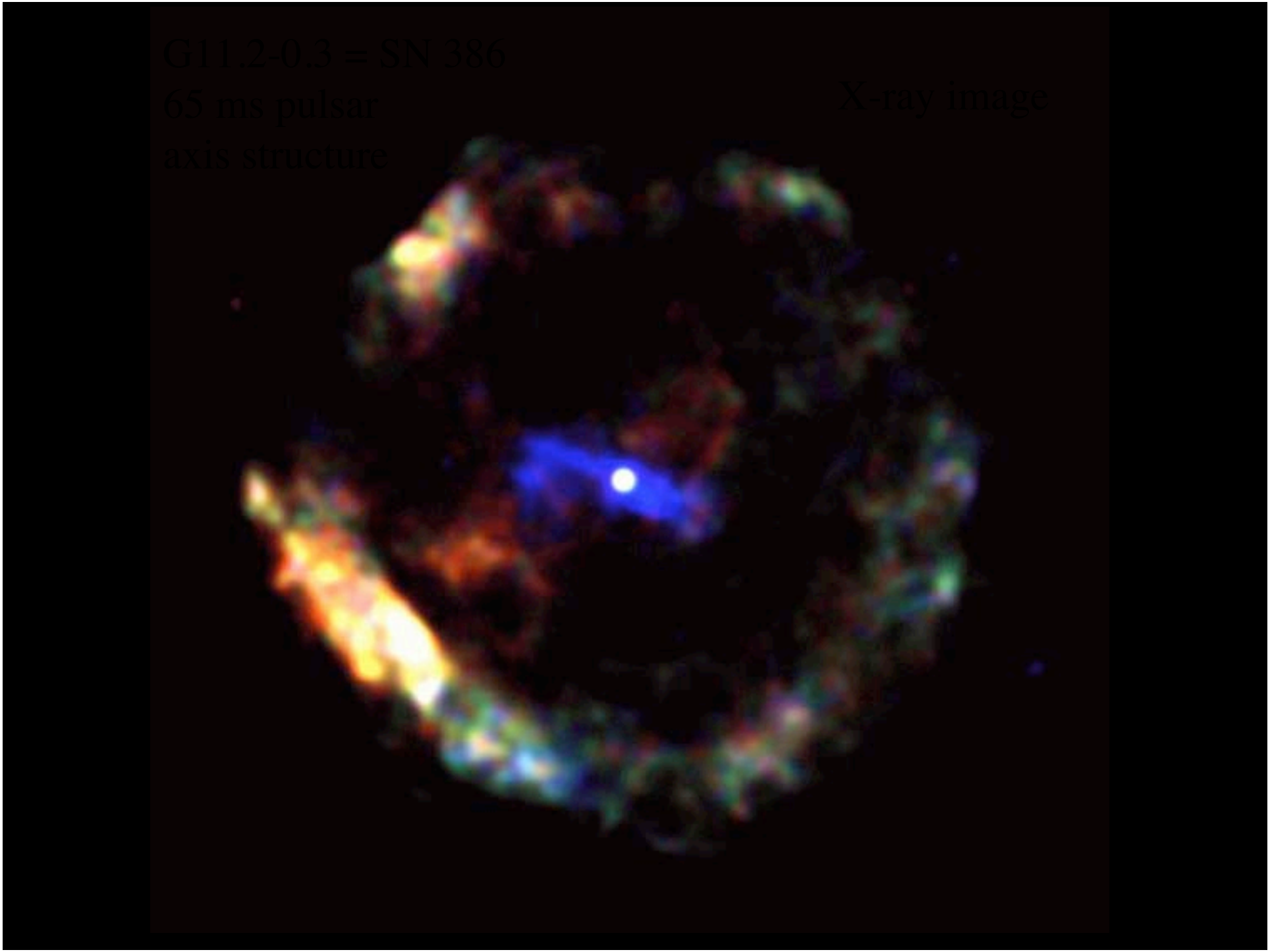
SN 386	earliest record	NS, jet?
SN 1006	brightest	No NS
SN 1054	Crab Nebula	NS, jets
SN 1181	(Radio Source 3C58)	NS, jets
SN 1572	Tycho	No NS
SN 1604	Kepler	No NS
~1680	Cas A	NS? jets
SN 1987A	nearby galaxy	NS? jets
Vela	10,000 years ago	NS, jets

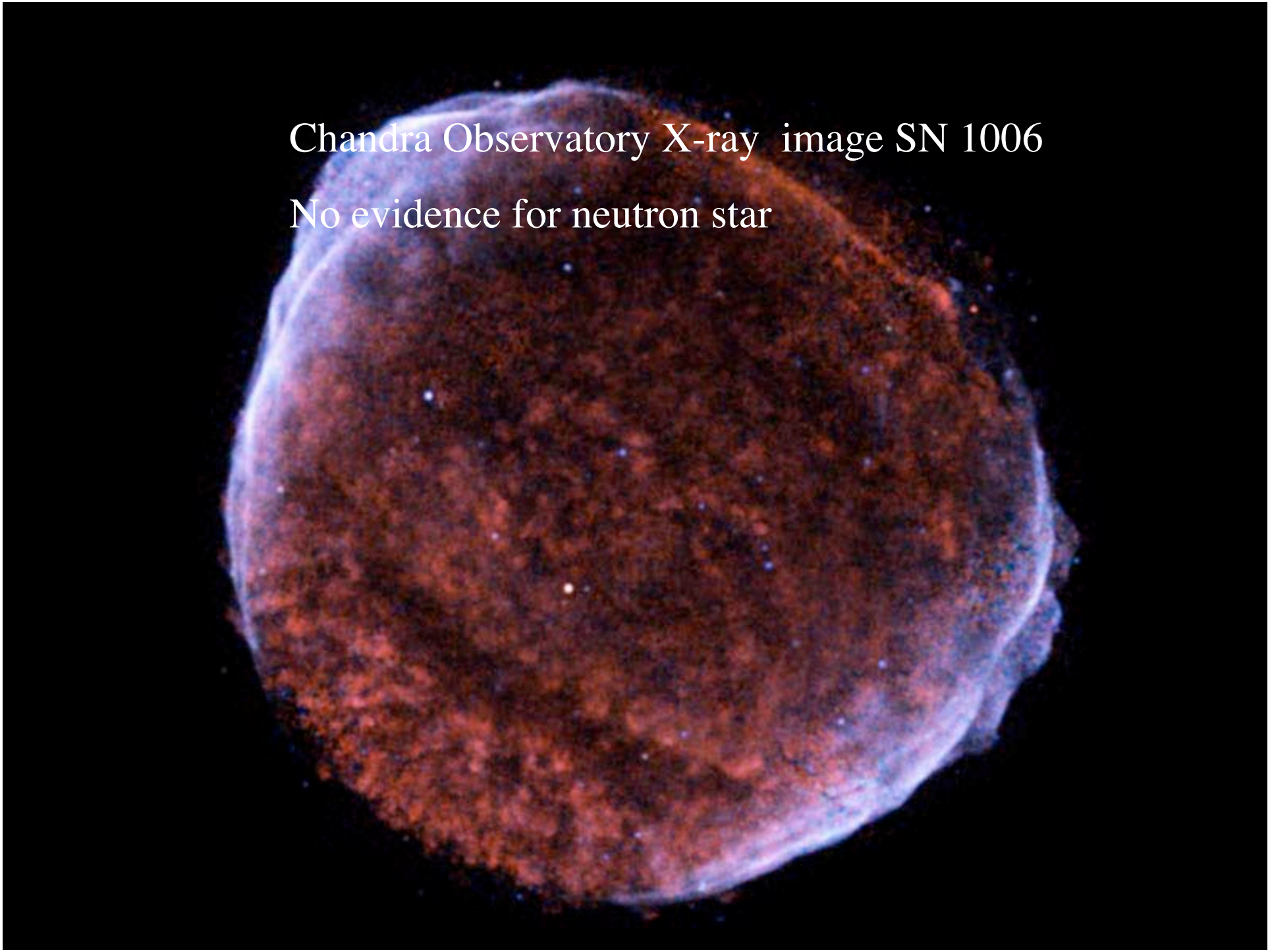
G11.2-0.3 = SN 386

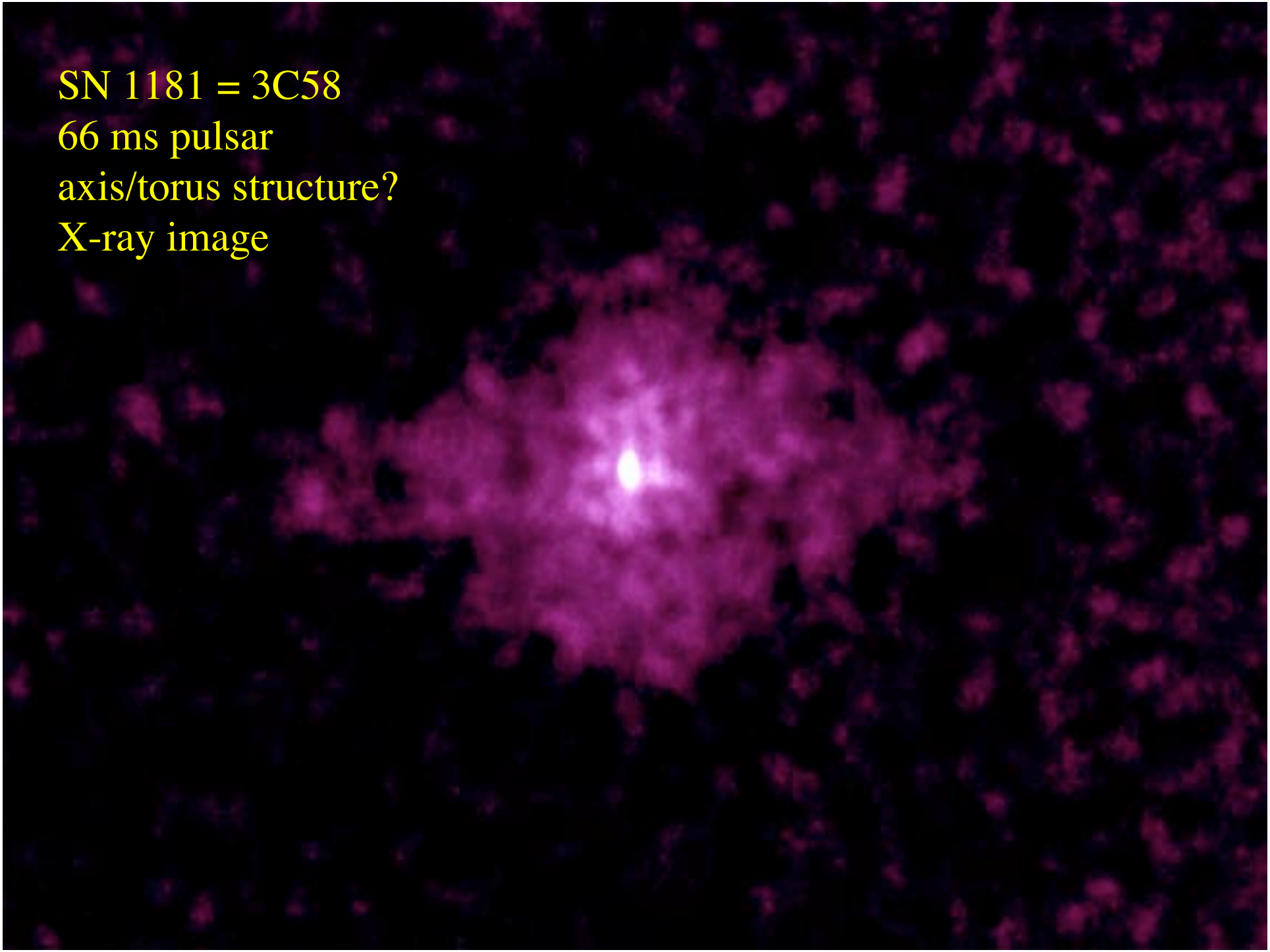
65 ms pulsar

axis structure

X-ray image




Chandra Observatory X-ray image SN 1006
No evidence for neutron star

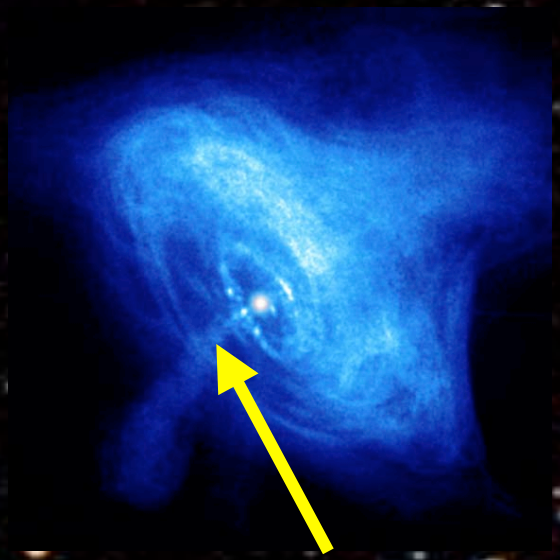

SN 1181 = 3C58
66 ms pulsar
axis/torus structure?
X-ray image

Crab Nebula

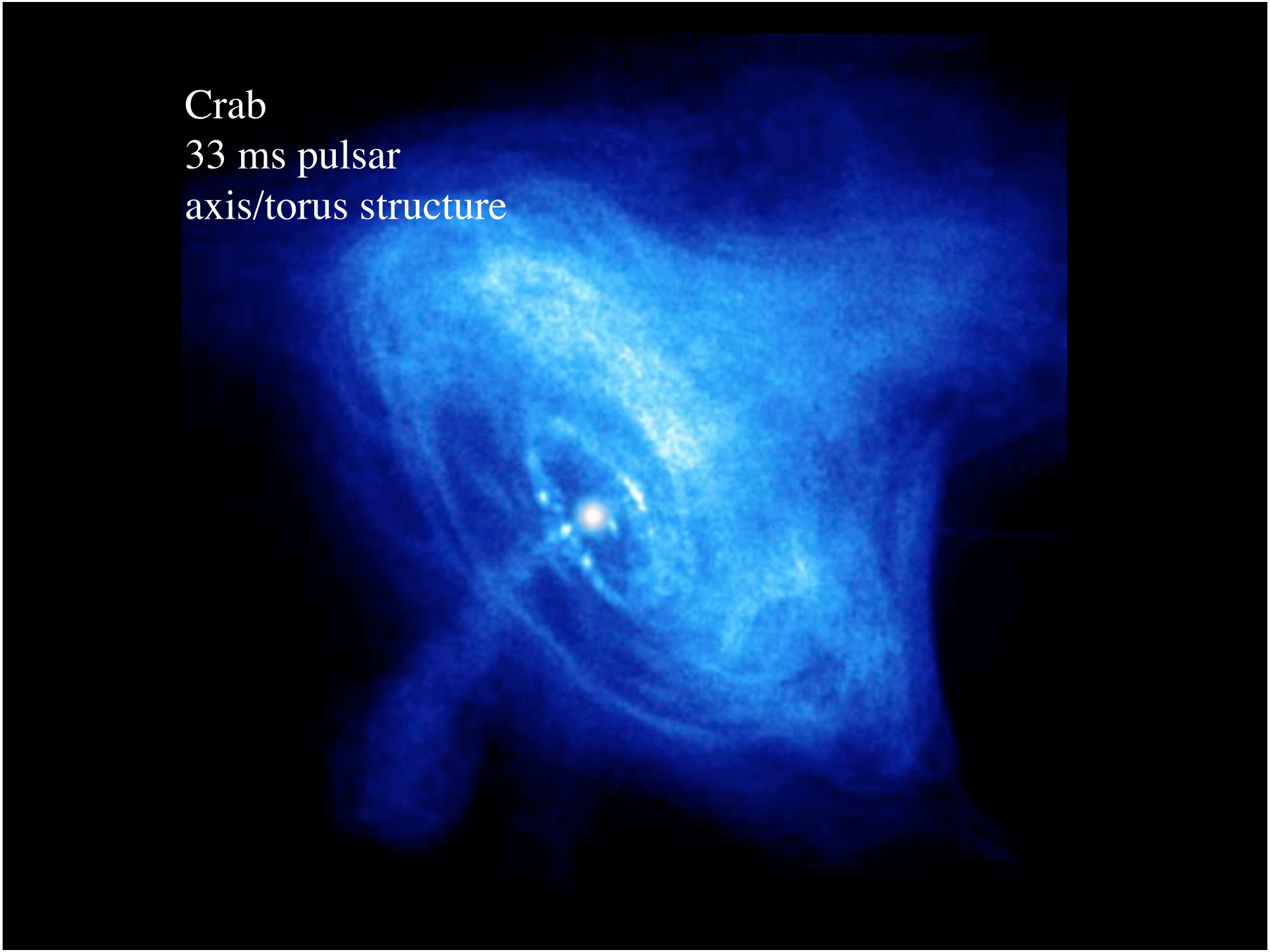
Remnant of "Chinese" Guest Star of 1054

Optical Image

Chandra Observatory
X-Ray Image



Left-over jet

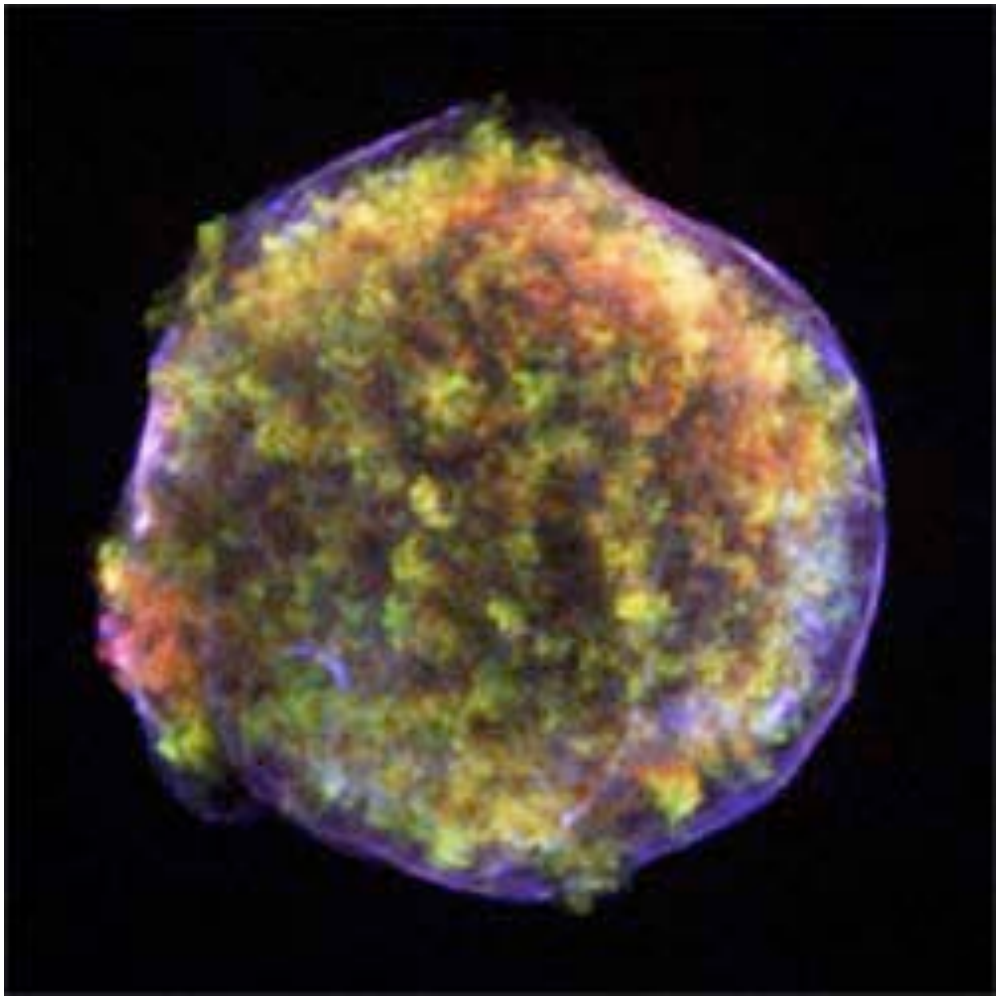

Crab
33 ms pulsar
axis/torus structure

Kepler

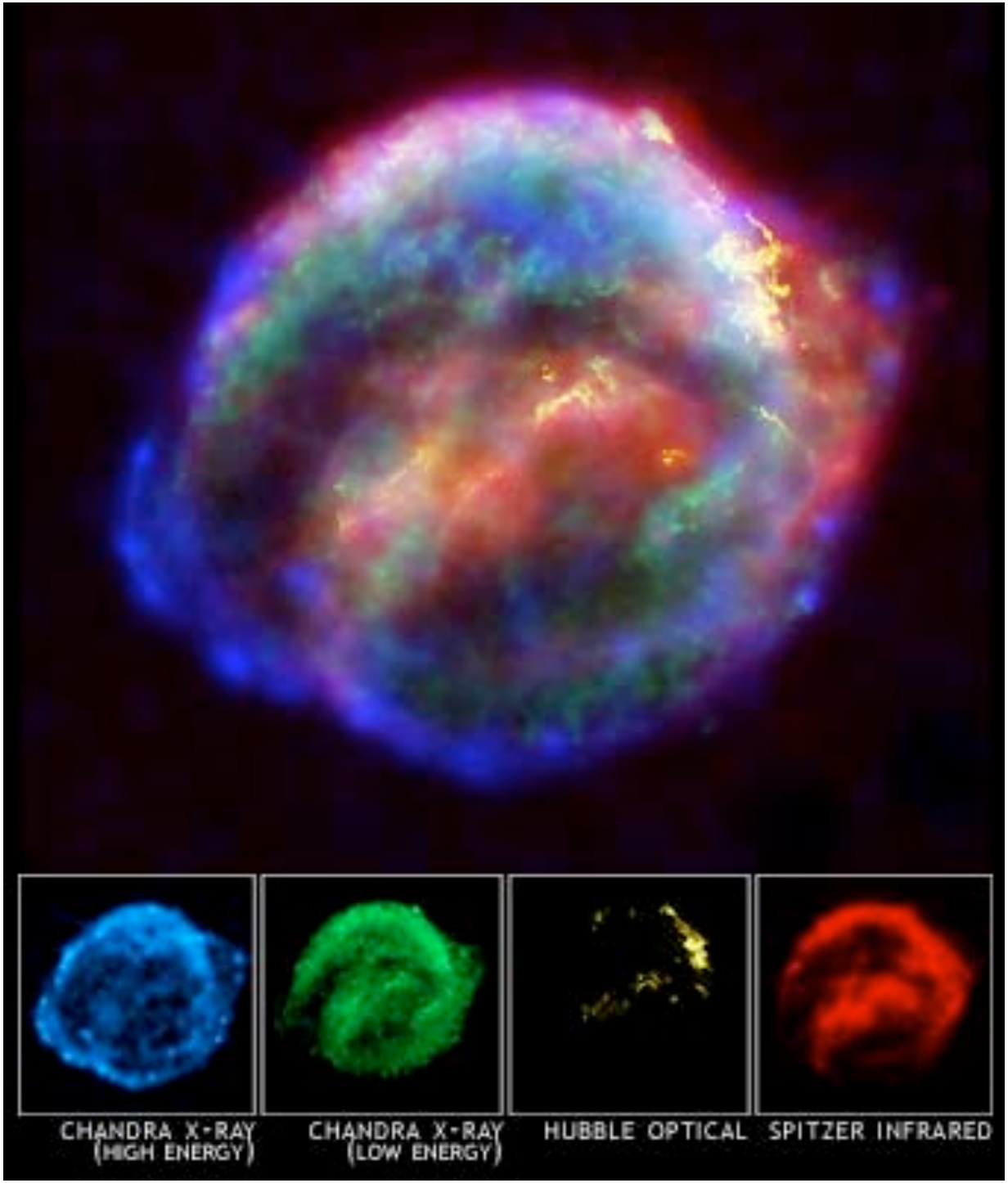
Tycho

Chandra Observatory X-ray Image of
Tycho's Supernova of 1572

No evidence for neutron star



SN 1006

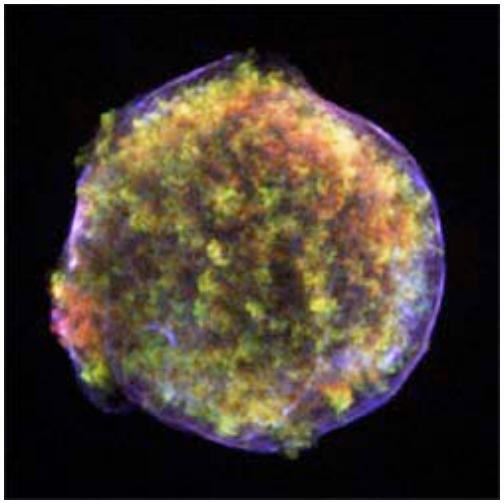


Great Observatories composite of Kepler's supernova 1604

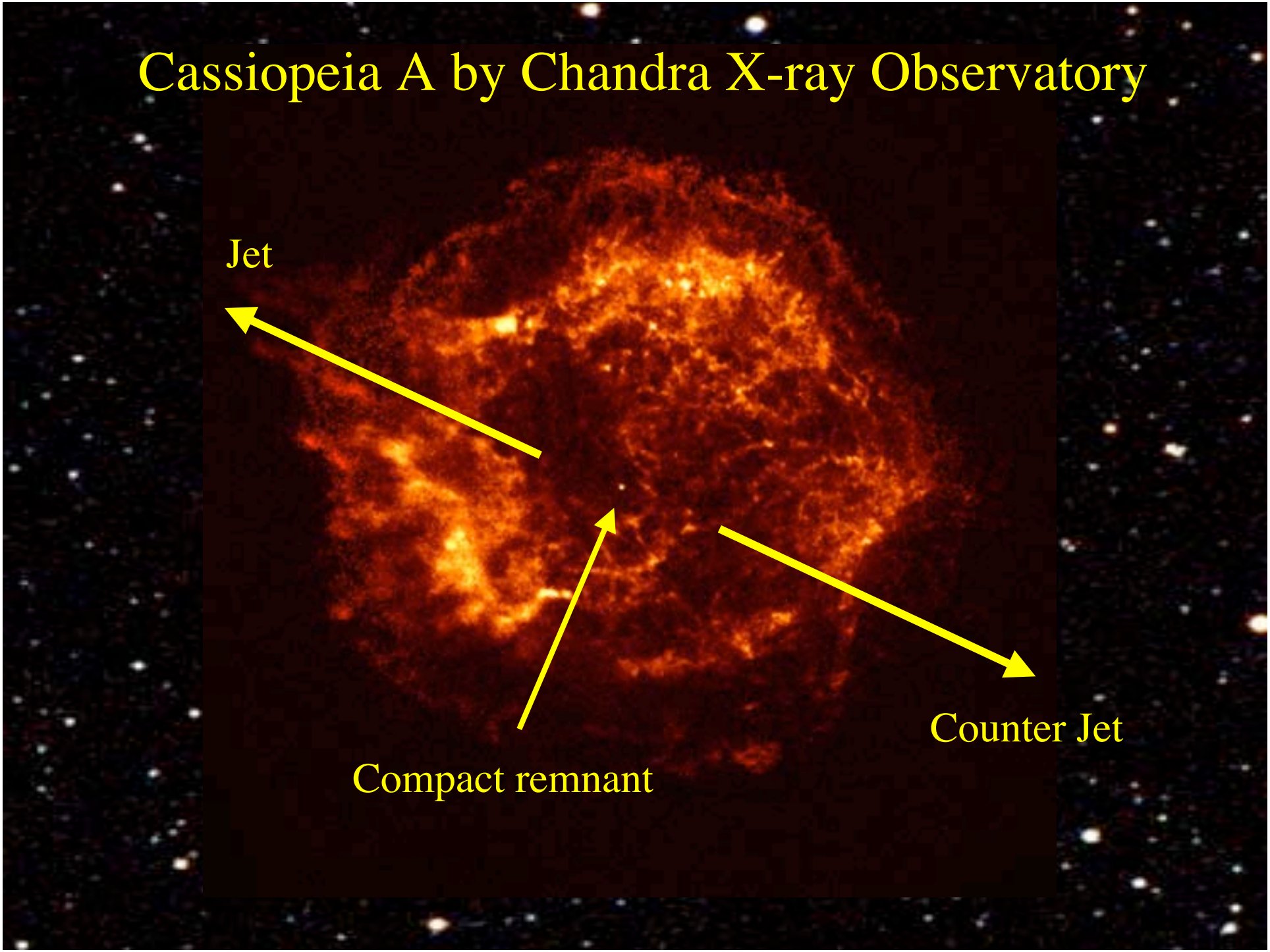
No sign of neutron star

"sideways" alignment?

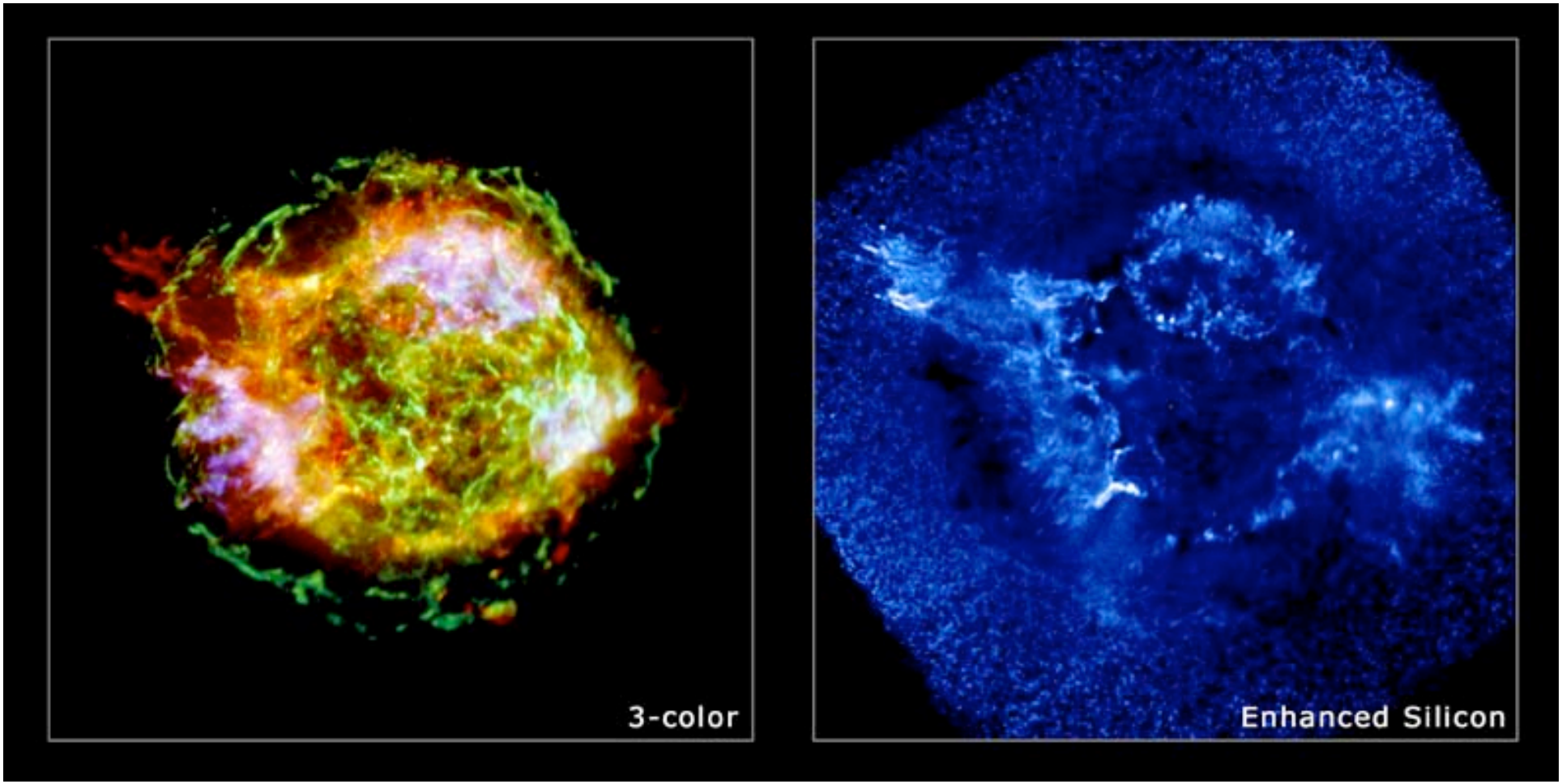
SN 1572 Tycho



Cassiopeia A by Chandra X-ray Observatory



Recent Chandra Observatory X-ray Image of Cas A

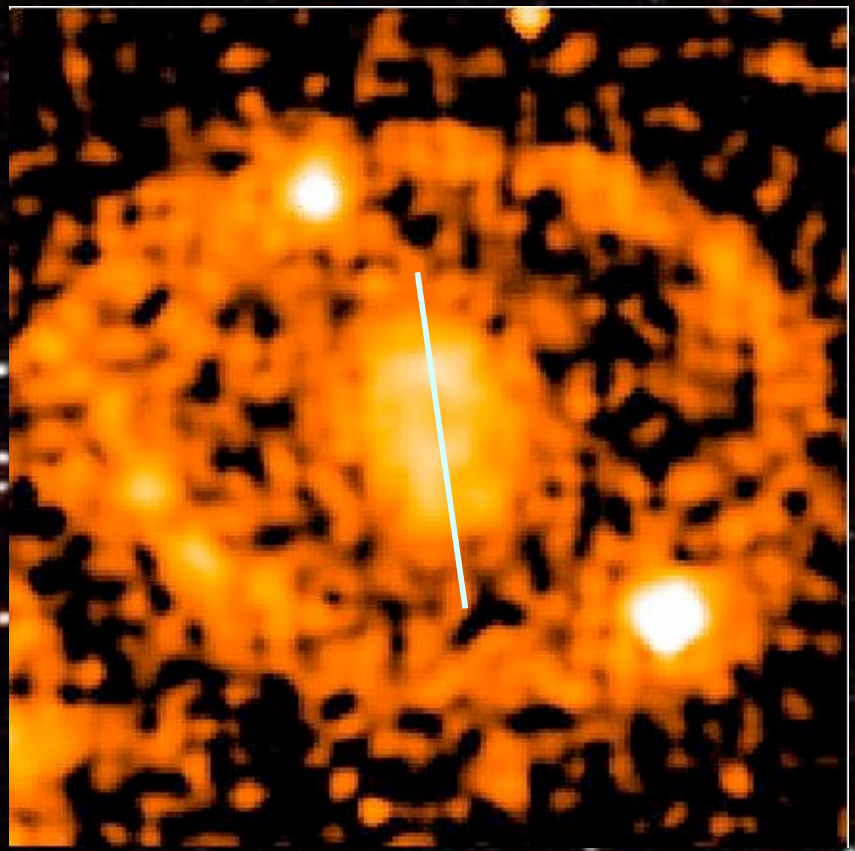


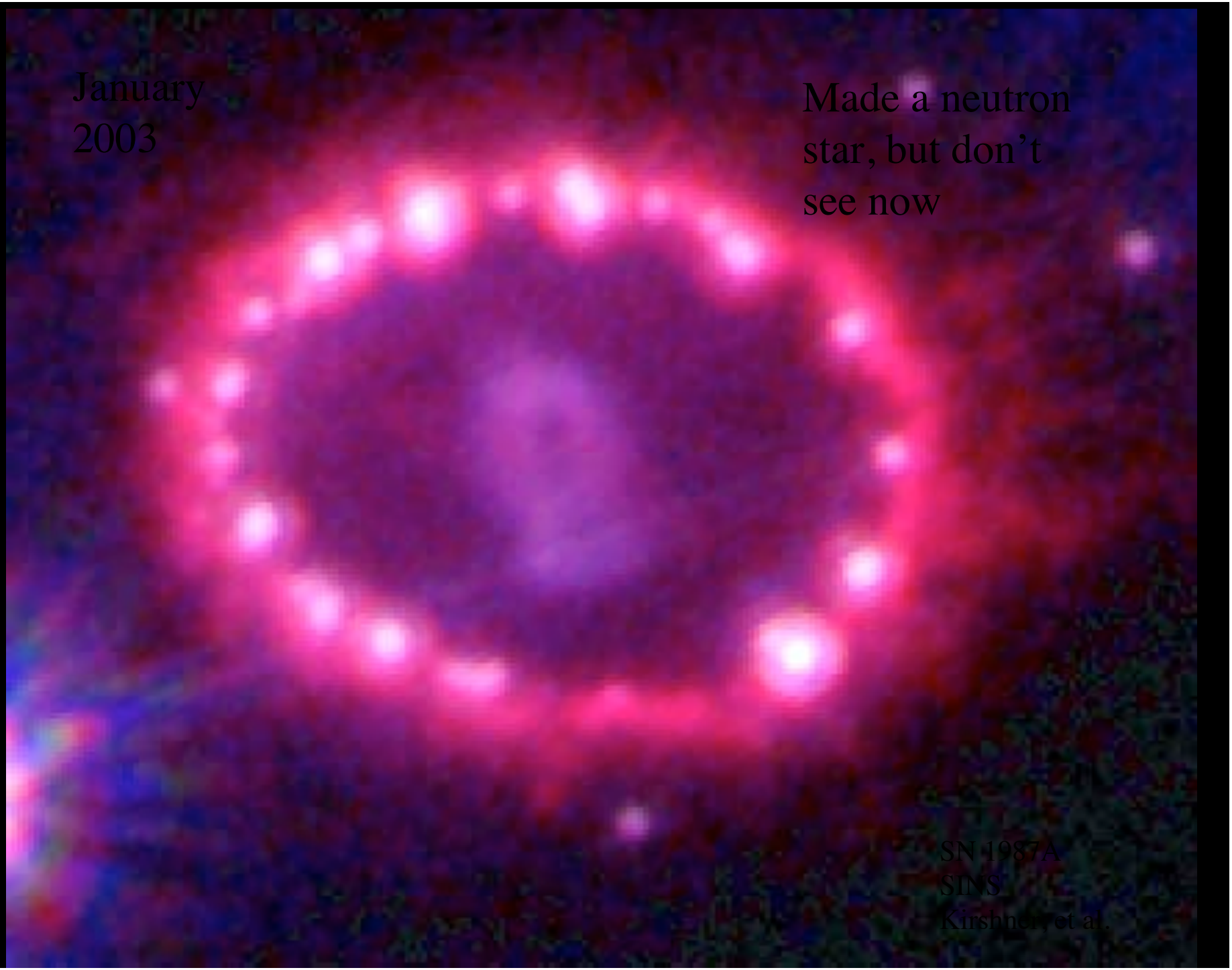
SN 1987A

Exploded in nearby galaxy

Bi-polar symmetry

Elongated debris




January
2003
Made a neutron
star, but don't
see now
SN 1987A
SINS
Kirshner et al.

Sky Watch Extra Credit - location of supernovae

SN 1006 - Lupus/Centaurus (probably too far South)

SN 1054 Crab Nebula - Taurus

SN 1572 Tycho - Cassiopeia

SN 1604 Kepler - Ophiuchus

Cassiopeia A - Cassiopeia

Betelgeuse - Orion, Red Supergiant due to explode "soon" 15 solar masses

Antares - Bright Red Supergiant in Scorpius, 15 to 18 solar masses (+companion)

Rigel - Orion, Blue Supergiant due to explode later, 17 solar masses

U Sco - Scorpius, possible white dwarf supernova progenitor.

One Minute Exam

Tycho's supernova of 1572 shows no sign of a compact object left over in its center. This suggests that:

It made a jet

It was formed by the collapse of a massive star

It was formed by an exploding white dwarf

It actually exploded much earlier than 1572

Discussion point: What's going on here?