2/1/2008

Exam 1: Week from Today, Friday, February8
[First Sky Watch Reports Monday]

Chapter 5, portions of chapters 1 - 4, 40 multiple-choice questions

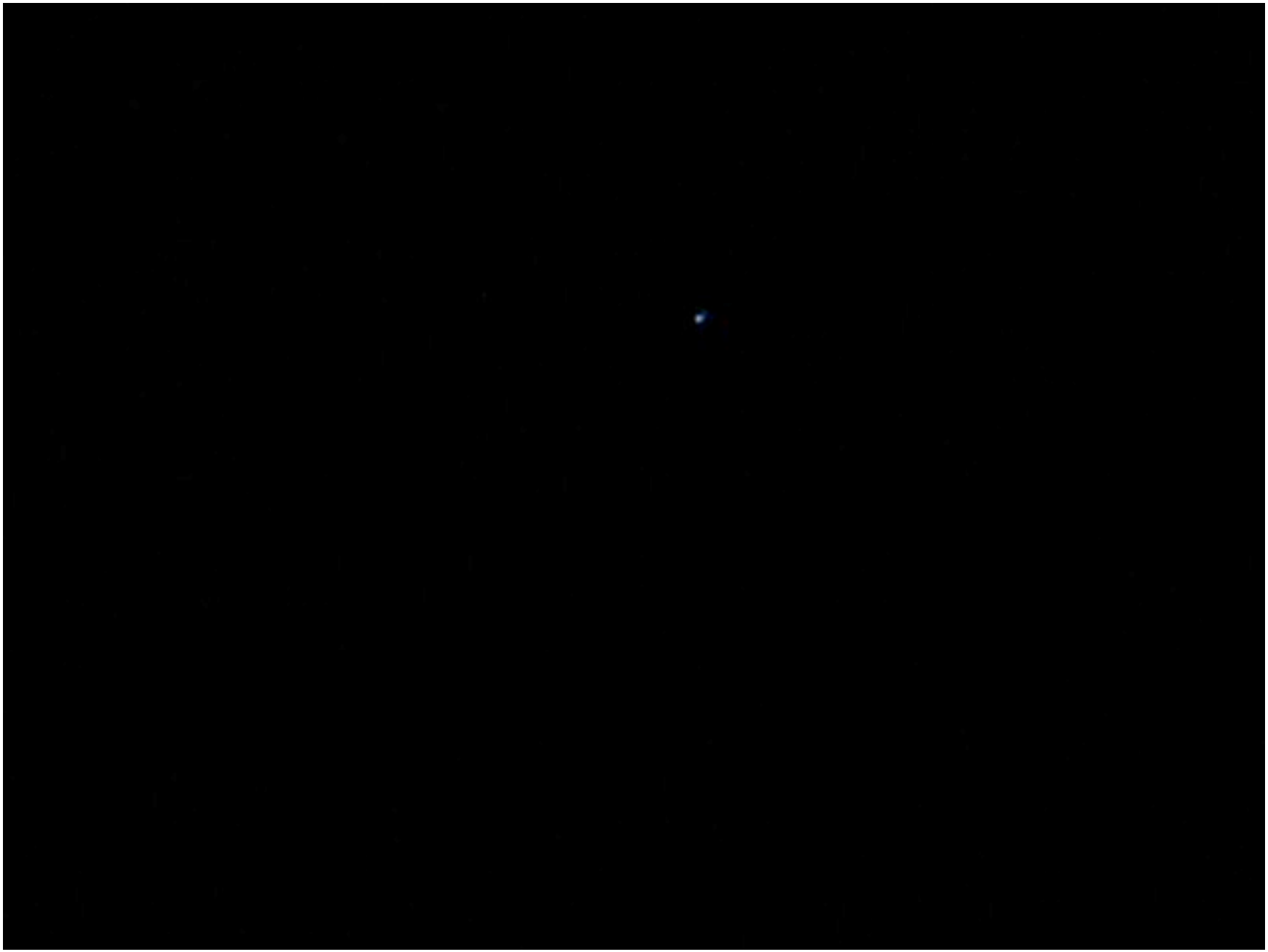
Review sheet will be posted on web site

Review session Thursday 5 PM RLM 15.216B

Astronomy in the news?

Pic of Day - Launch of Explorer, US gets into space, 50 years ago yesterday.

ULIT filmed in Austin last night



SUPERNOVAE

Catastrophic explosions that end the lives of stars,

Provide the heavy elements on which planets and life as we know it depends,

Energize the interstellar gas to form new stars,

Produce exotic compact objects, neutron stars and black holes,

Provide yardsticks to measure the history and fate of the Universe.

Reading:

Chapter 6 Supernovae

Also § 2.1, 2.2, 2.4 & 2.5 for background

Issues to look for in background:

Why is it necessary for a thermonuclear fuel to get hot to burn - charge repulsion § 2.1 & 2.2

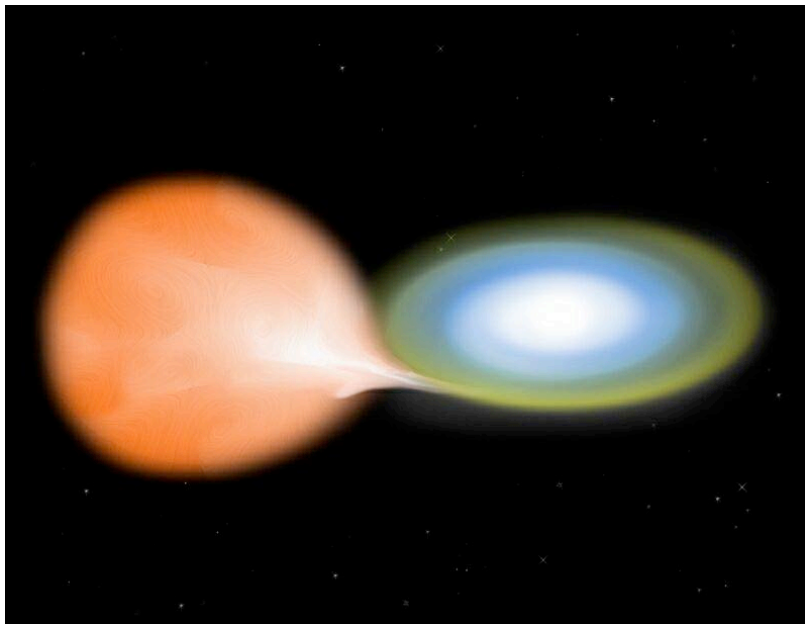
Core Collapse § 2.4 & 2.5

One type of supernova is powered by the ***collapse*** of the core of a massive star to produce

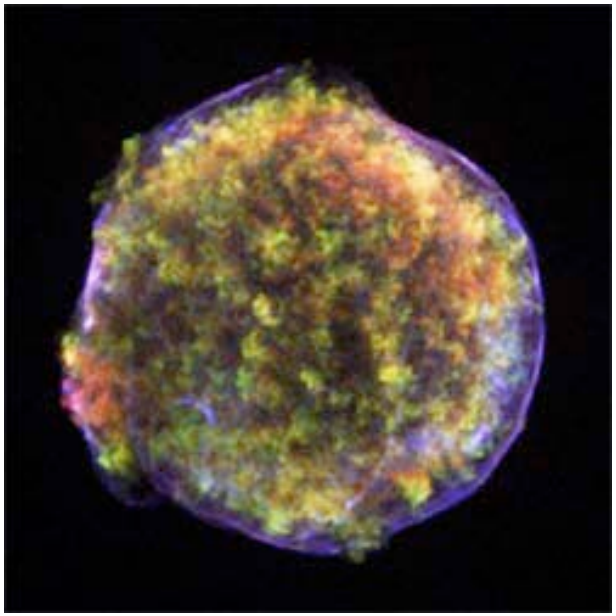
a ***neutron star***, or perhaps a ***black hole***

The mechanism of the explosion is still a mystery.

The other type of supernovae (Type Ia) is thought to come from a white dwarf that grows to an explosive condition in a binary system.



Chandra X-ray Observatory image
Of Tycho's supernova of 1572

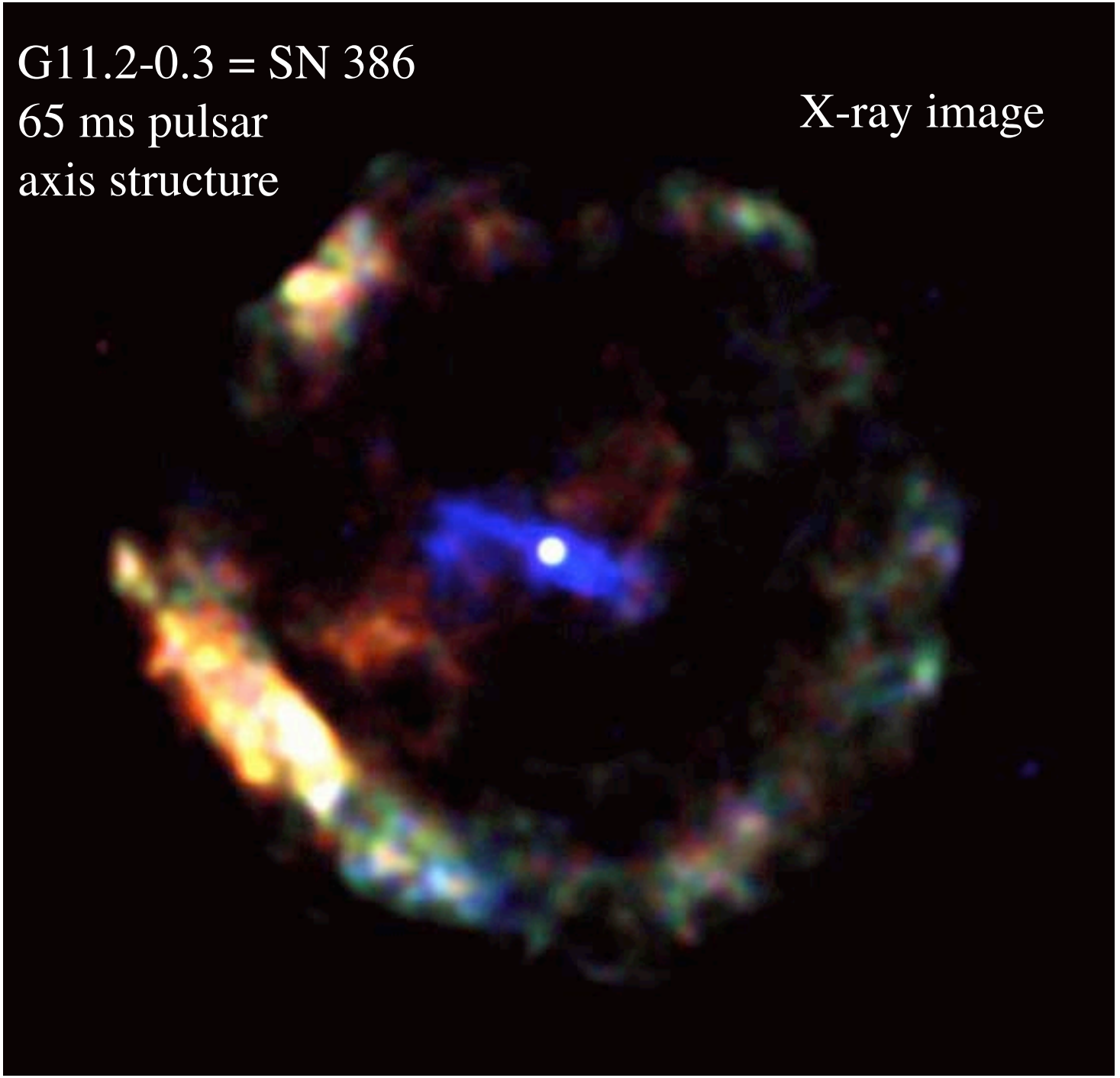


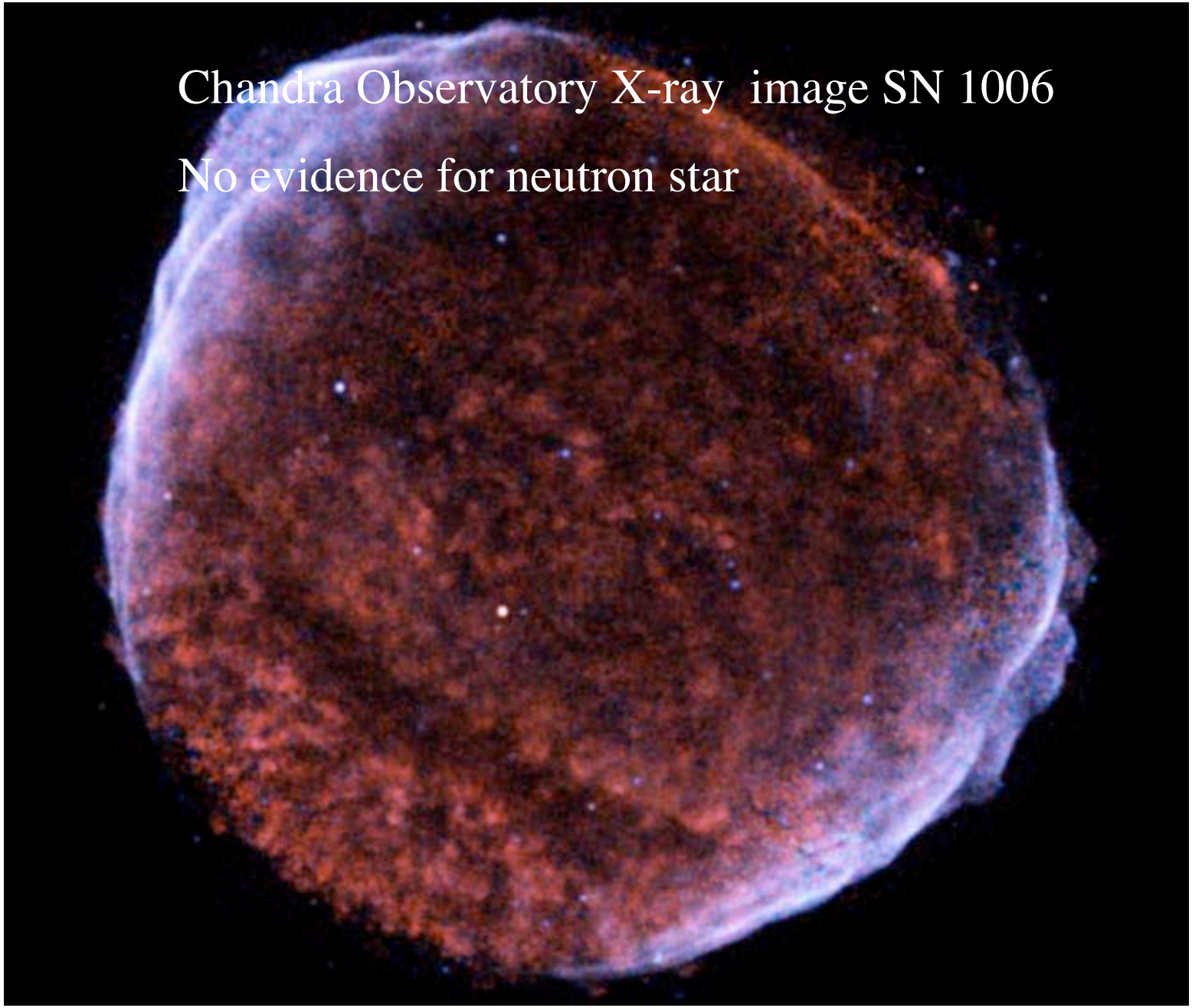
These explode completely, like a stick of dynamite, and leave no compact object (neutron star or black hole) behind.

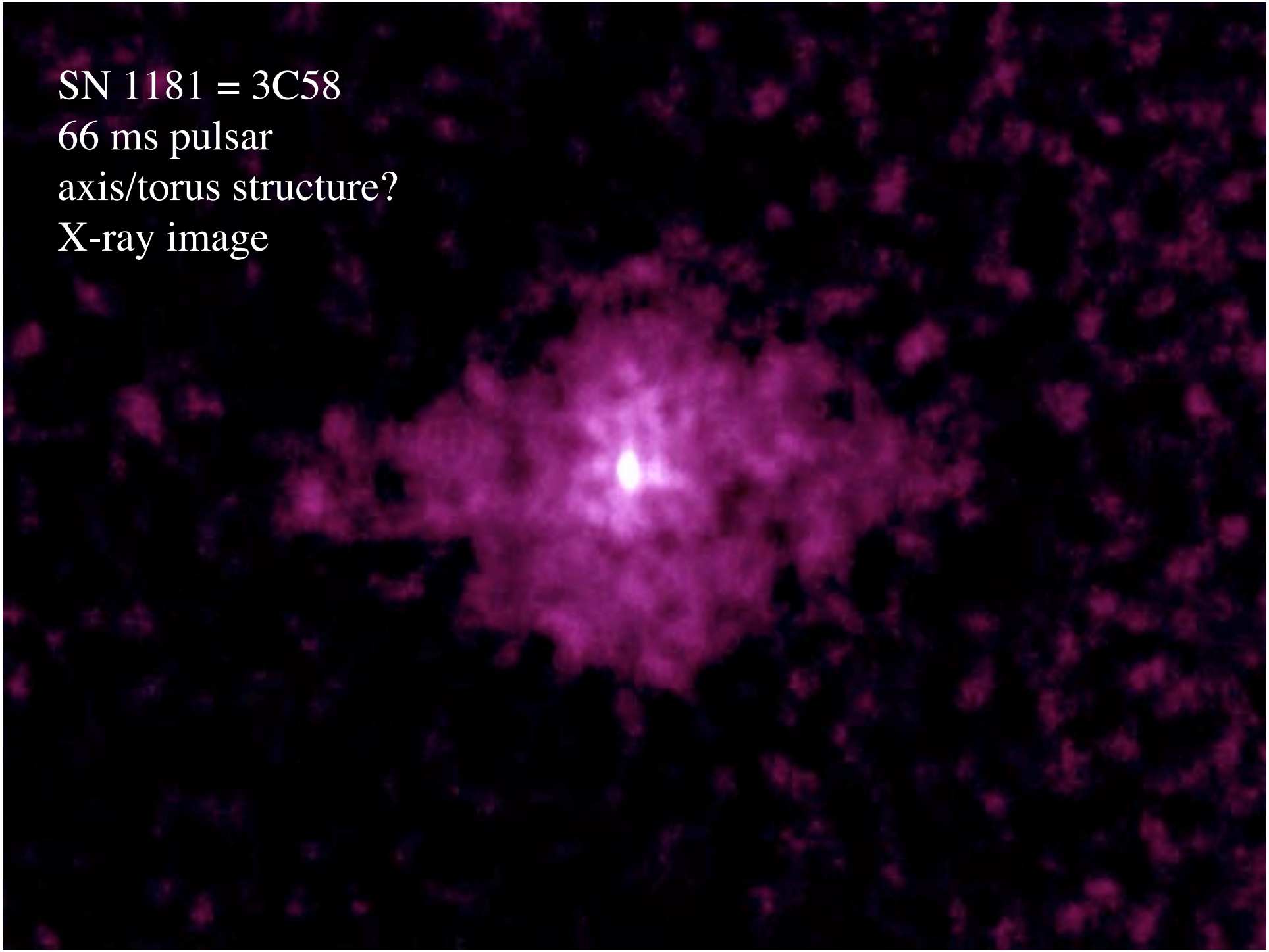
Chapter 6 Supernovae

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

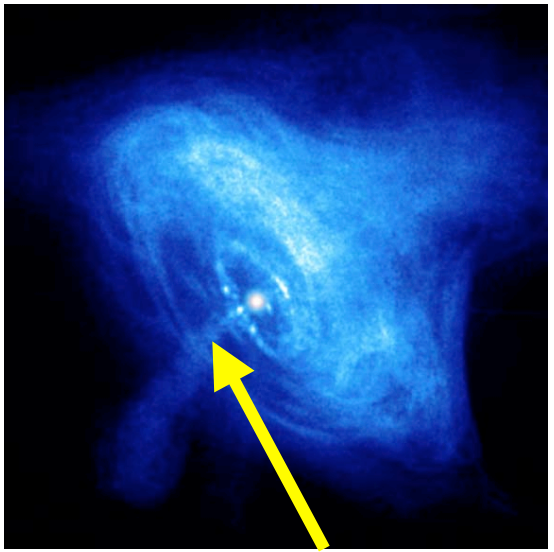

SN 1181 = 3C58
66 ms pulsar
axis/torus structure?
X-ray image

Crab Nebula

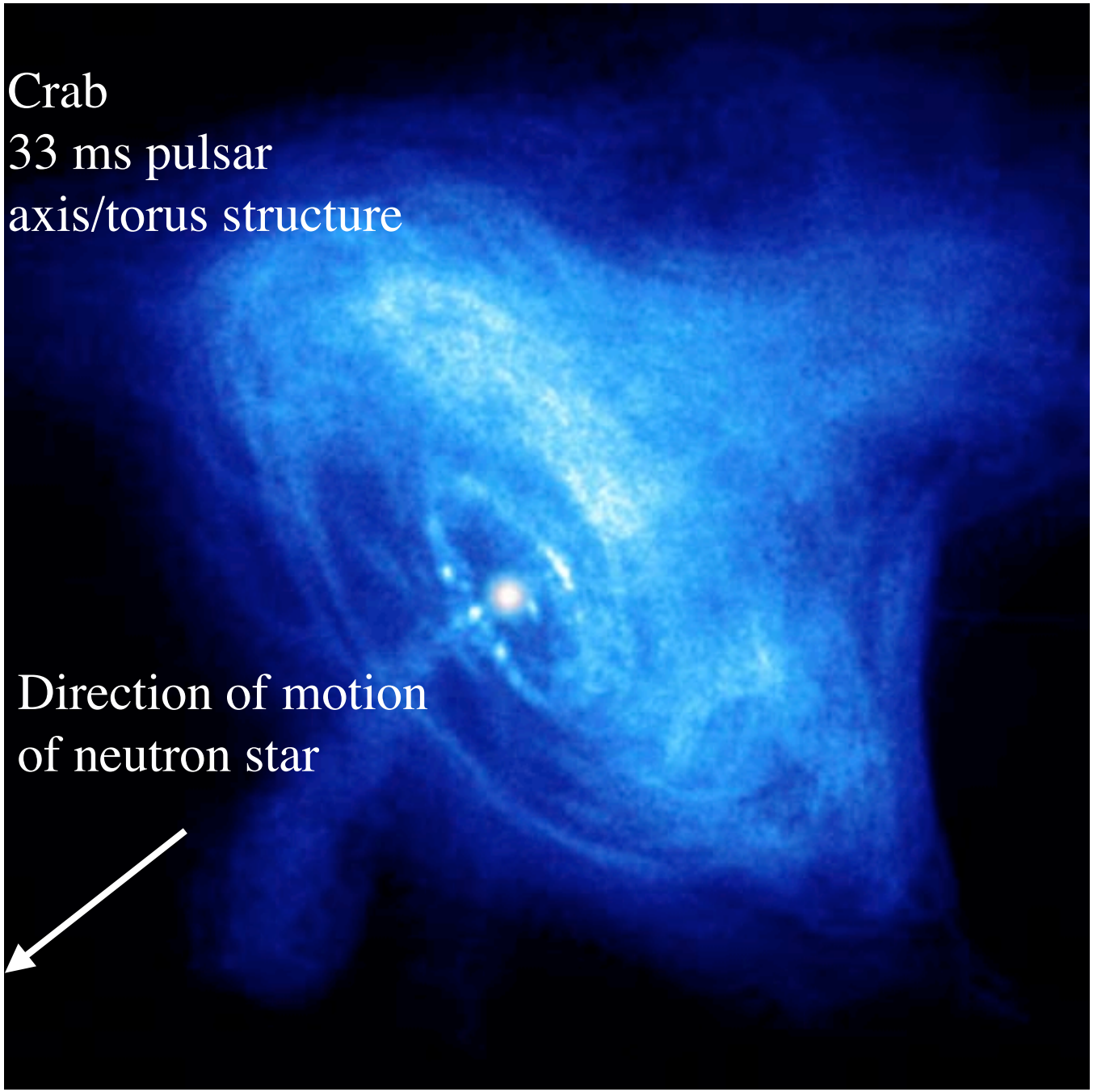
Remnant of “Chinese” Guest Star of 1054

Optical Image

Chandra Observatory
X-Ray Image



Left-over jet


Crab
33 ms pulsar
axis/torus structure
Direction of motion
of neutron star

Crab nebula movie

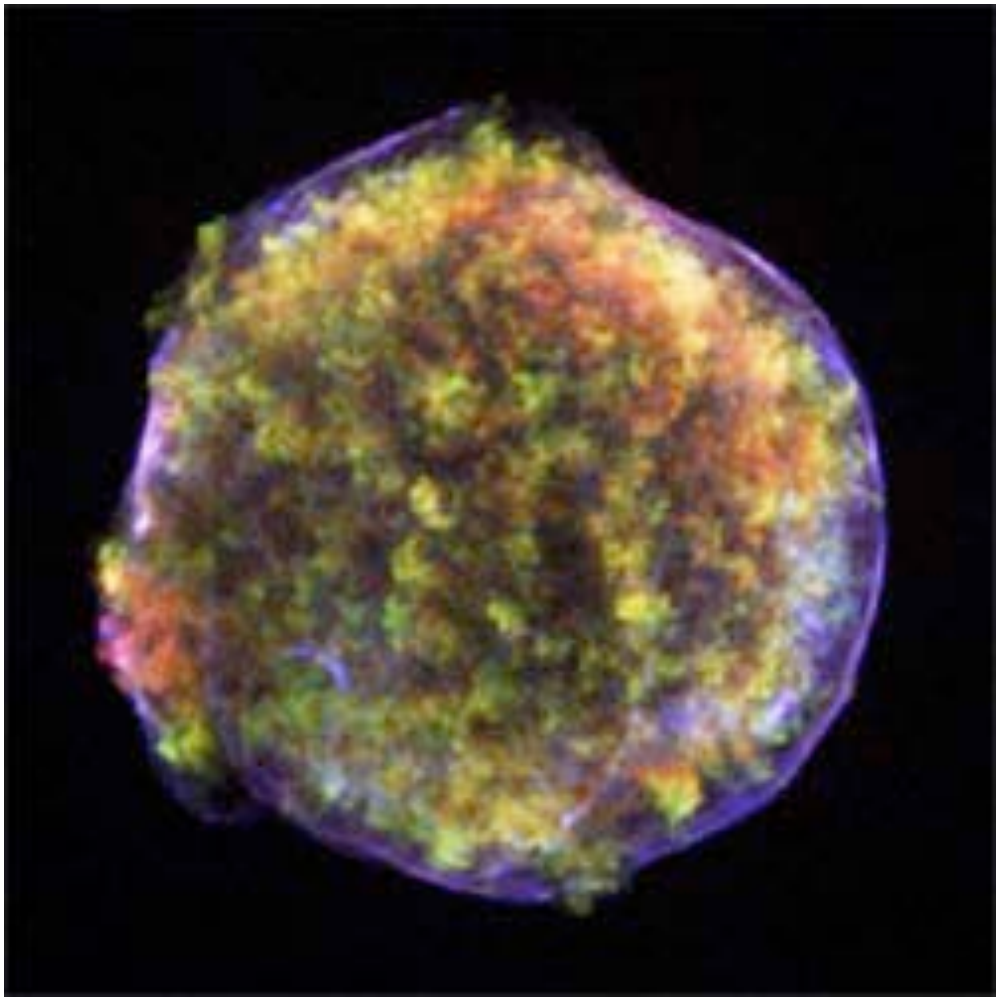
http://hubblesite.org/newscenter/archive/releases/1996/22/video/a/

Kepler

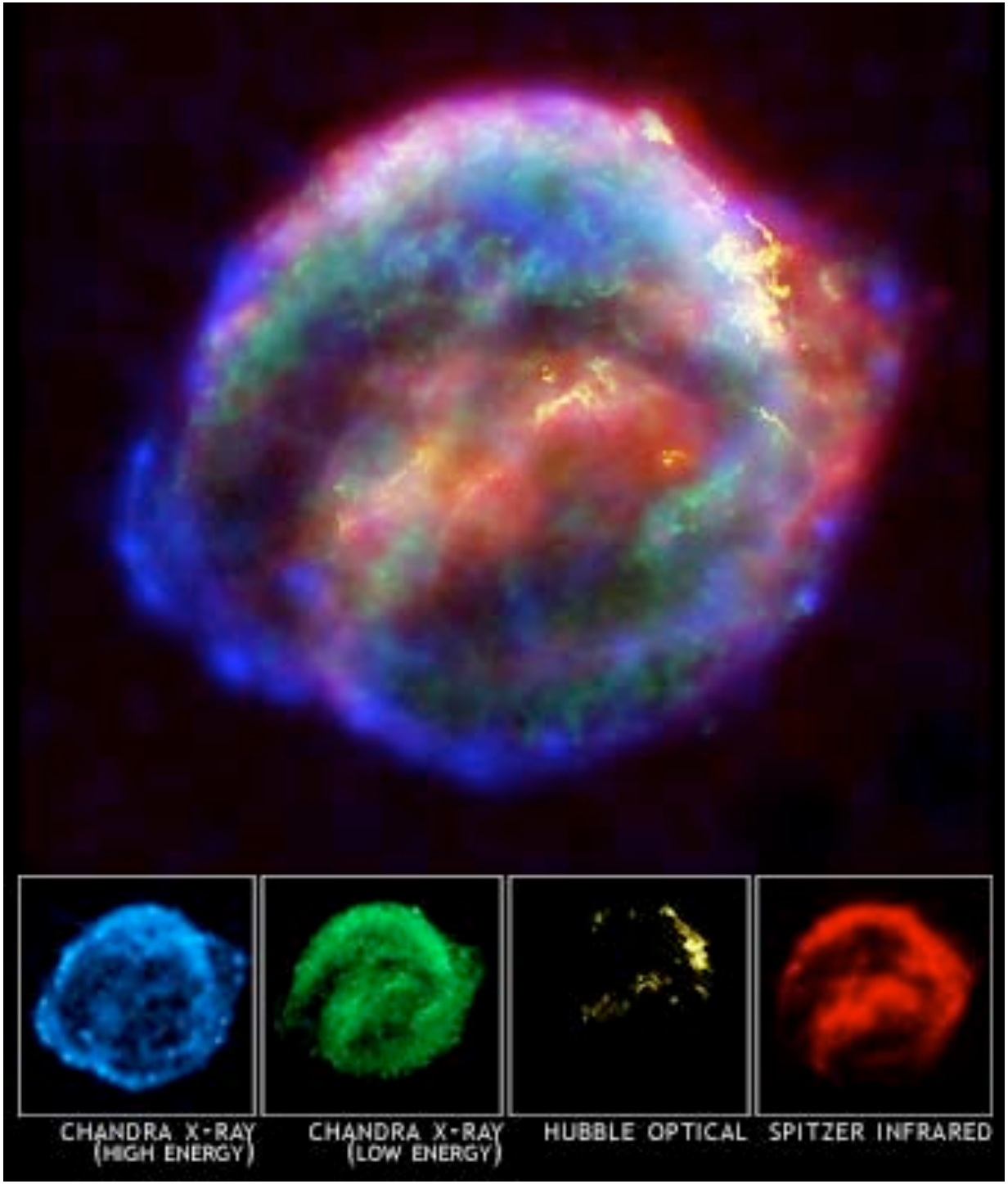
Tycho

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

No evidence for neutron star



SN 1006

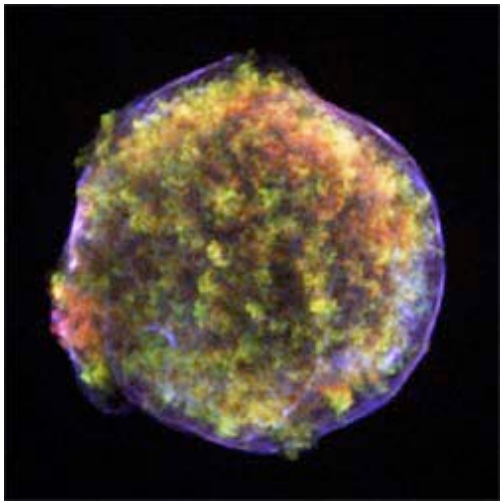


Great Observatories composite of Kepler's supernova 1604

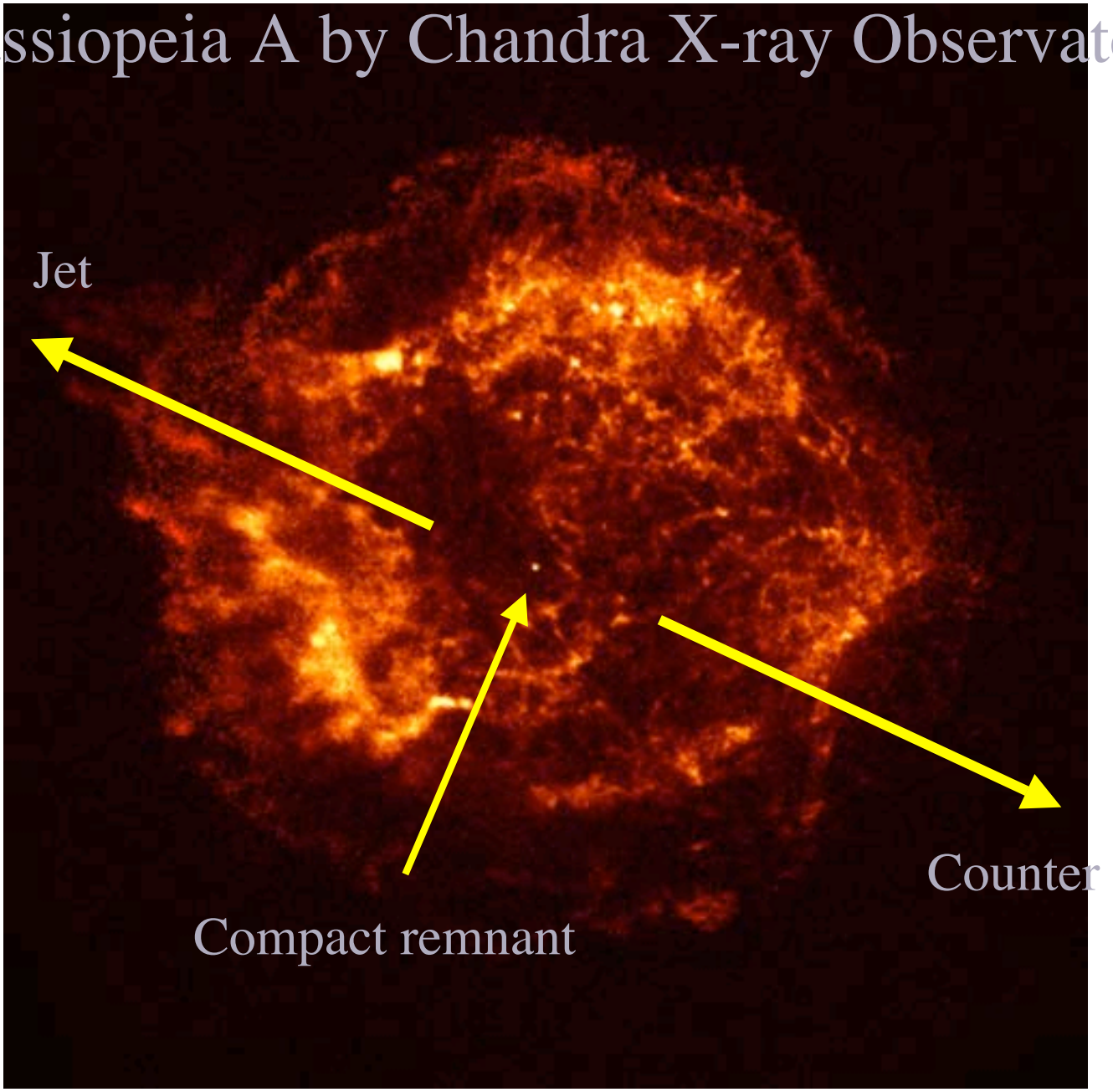
No sign of neutron star

"sideways" alignment?

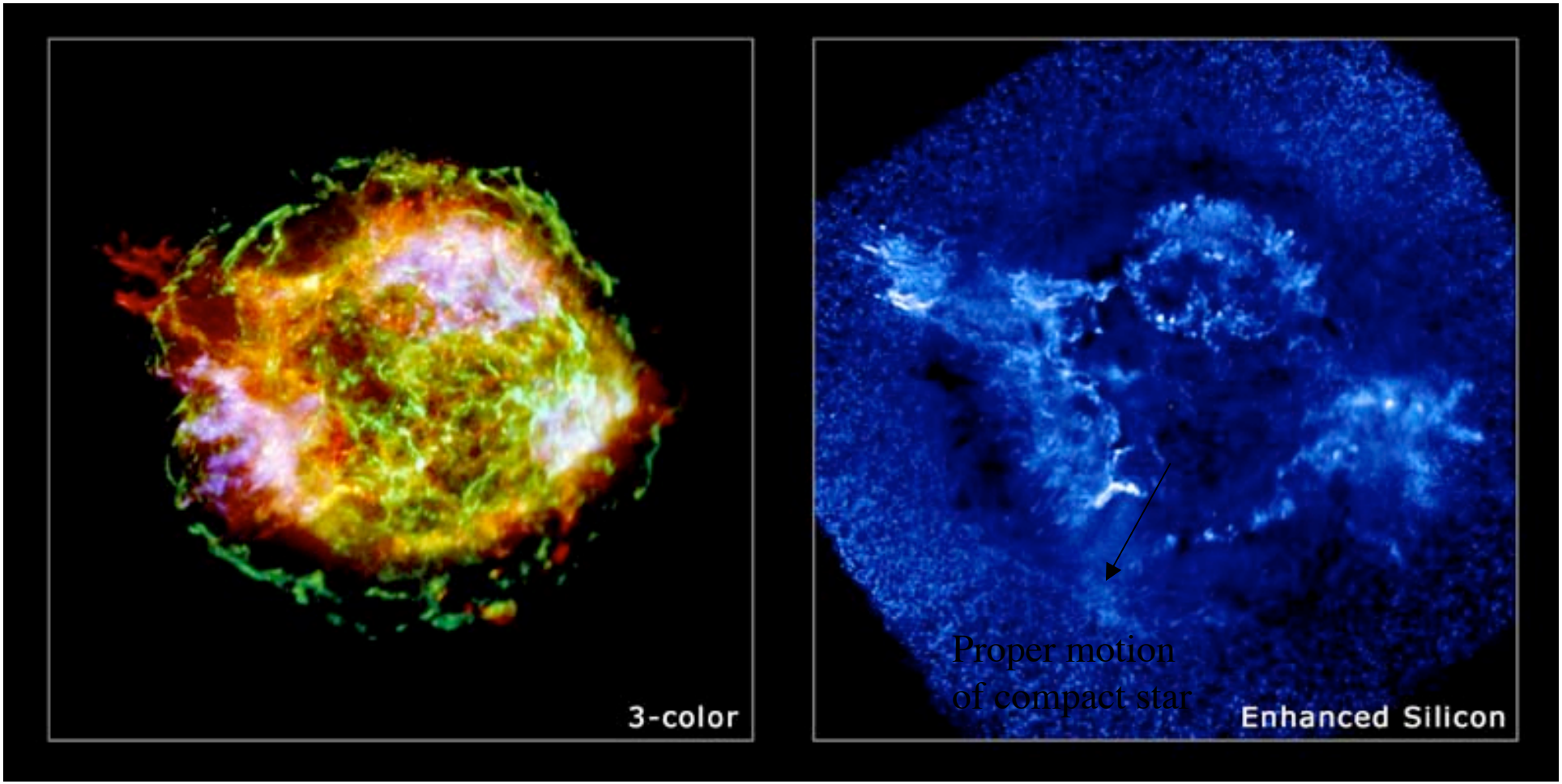
SN 1572 Tycho



Cassiopeia A by Chandra X-ray Observatory



Recent Chandra Observatory X-ray Image of Cas A

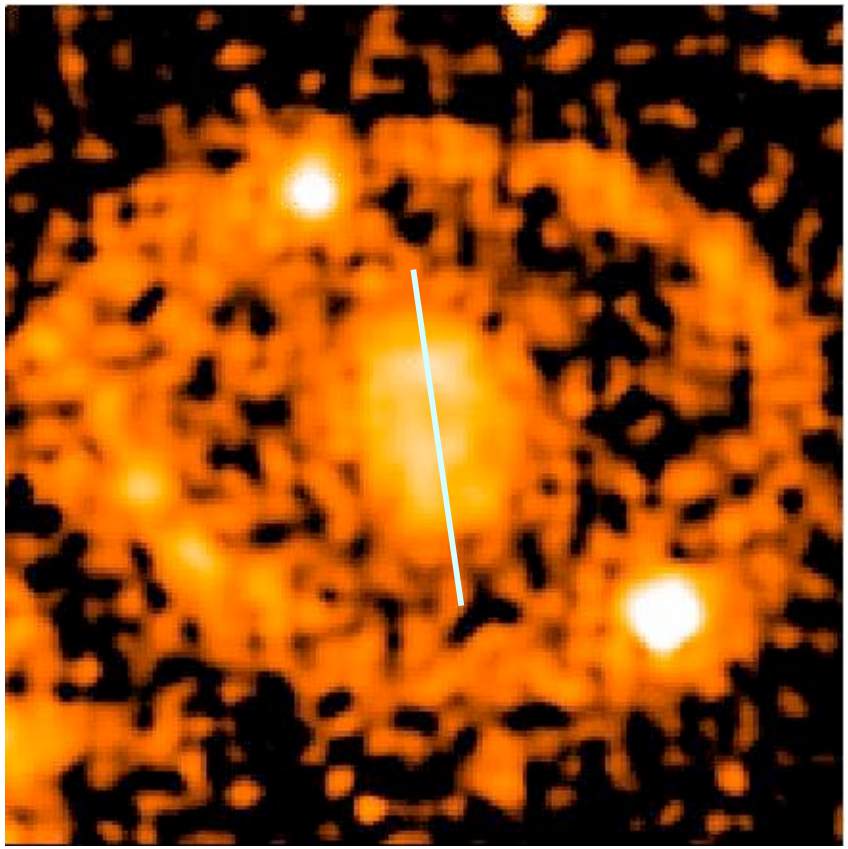


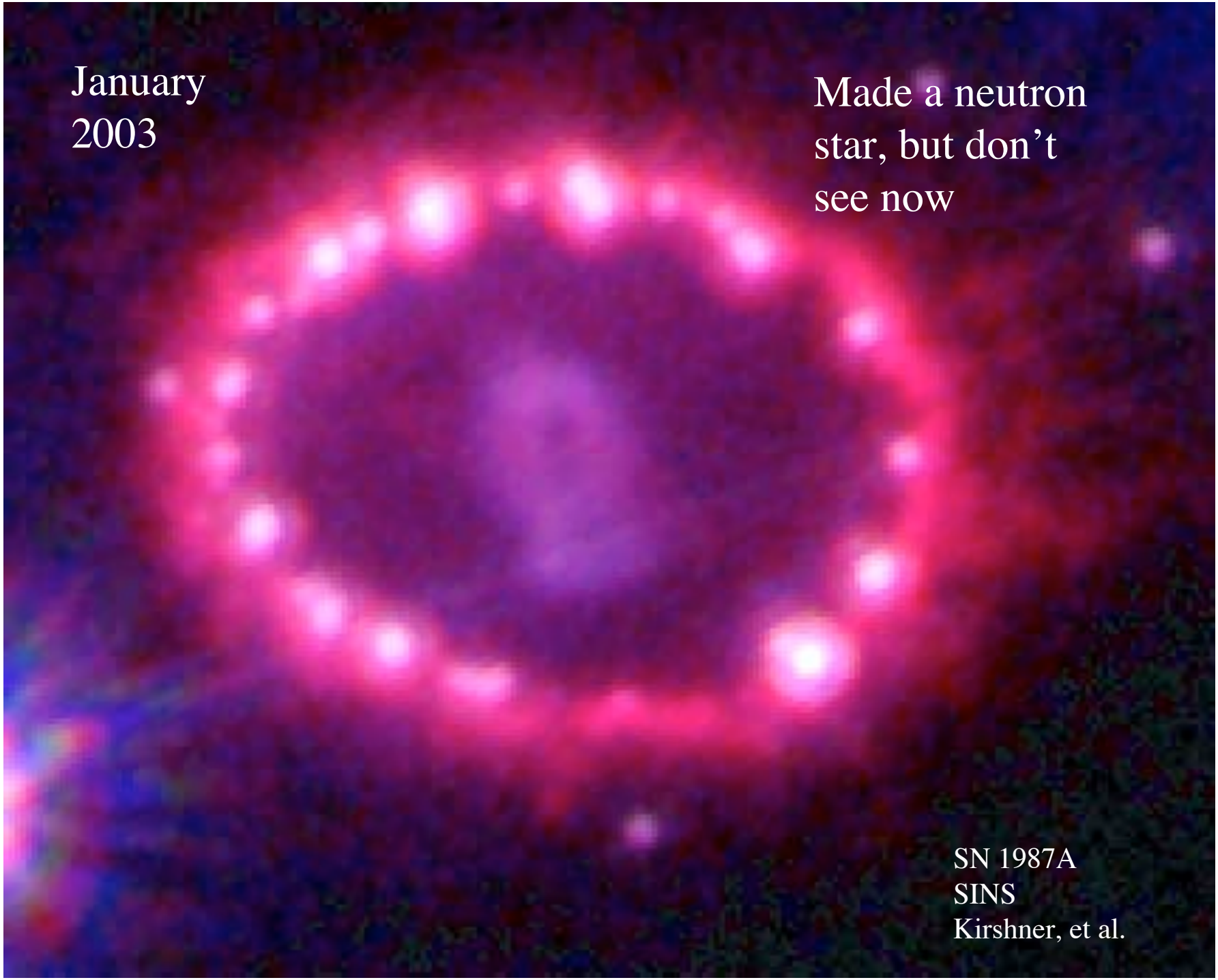
SN 1987A

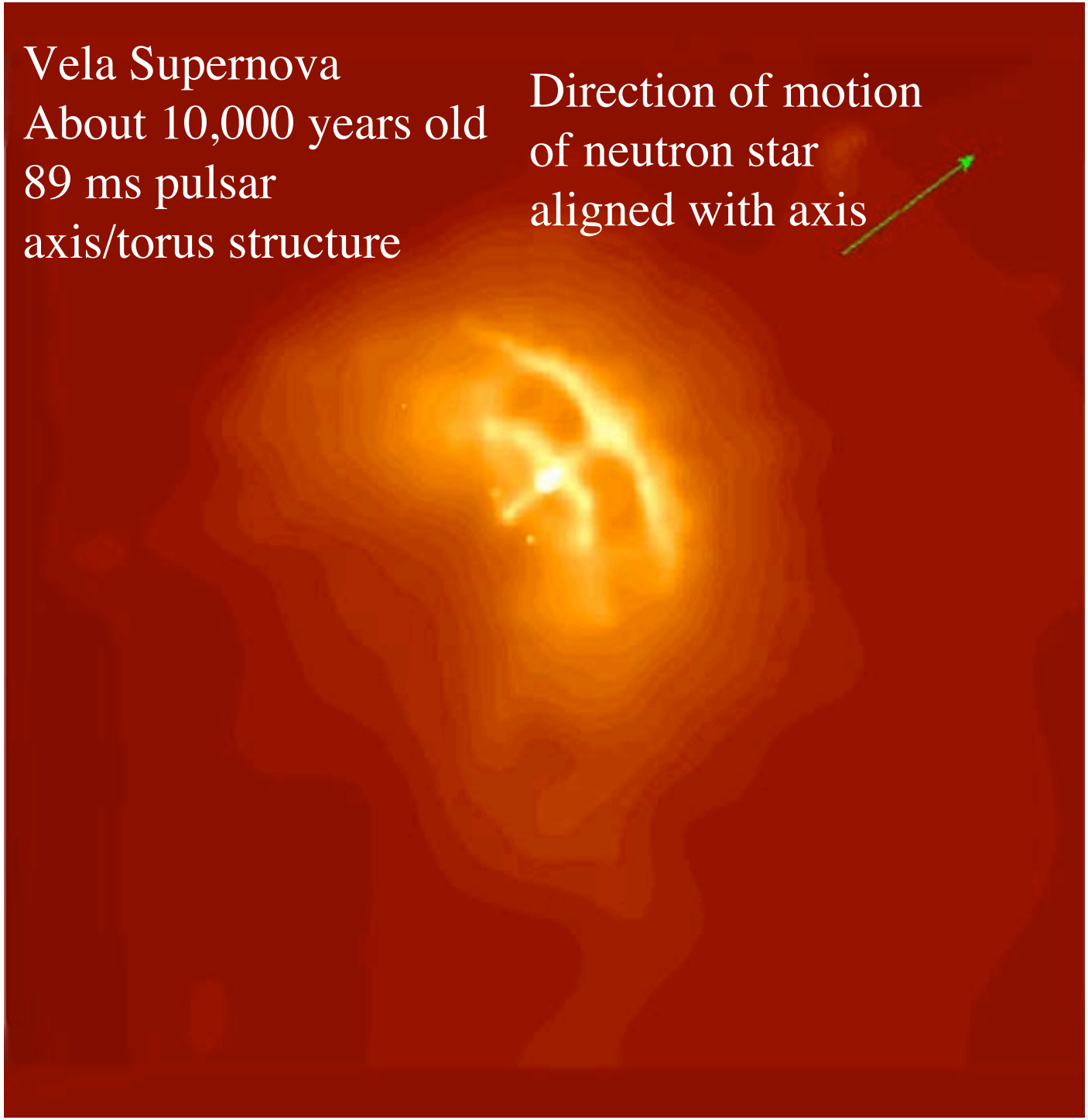
Exploded in nearby galaxy

Bi-polar symmetry

Elongated debris




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


Vela Supernova
About 10,000 years old
89 ms pulsar
axis/torus structure
Direction of motion
of neutron star
aligned with axis