Wednesday, January 28, 2015

Powerpoint of lectures is posted after every class.

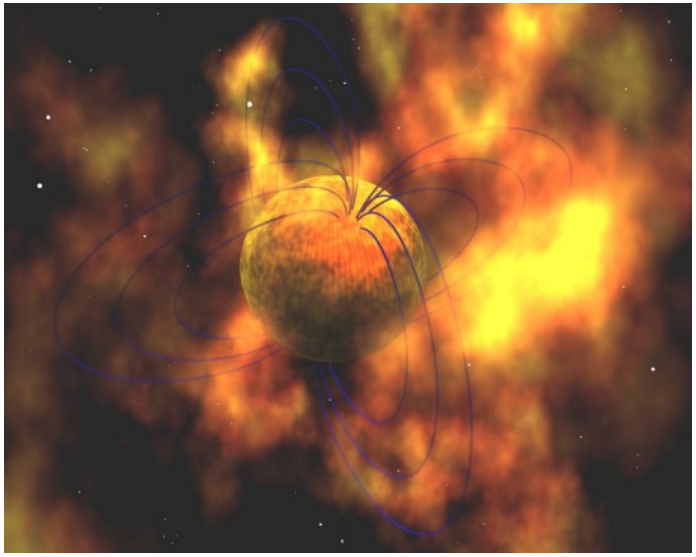
Astronomy in the news?

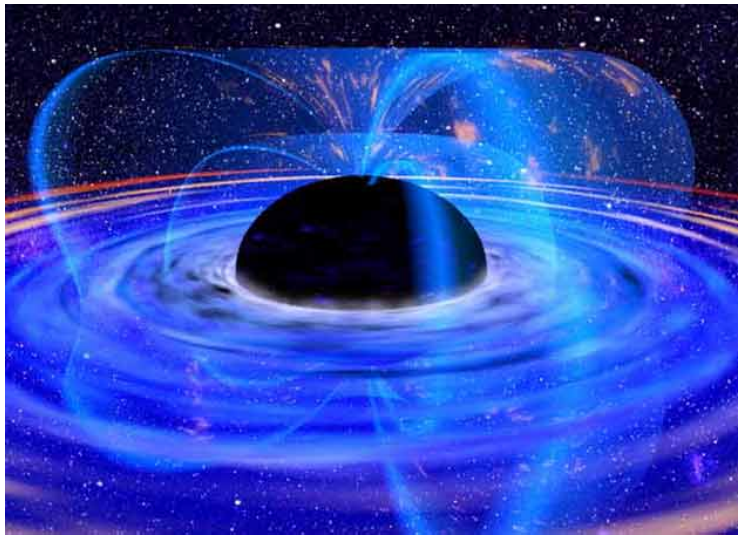
Asteroid that passed close to Earth yesterday had its own moon.

Black hole chokes on swallowed star – Texas press release, New York Times? Daily Texan?

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

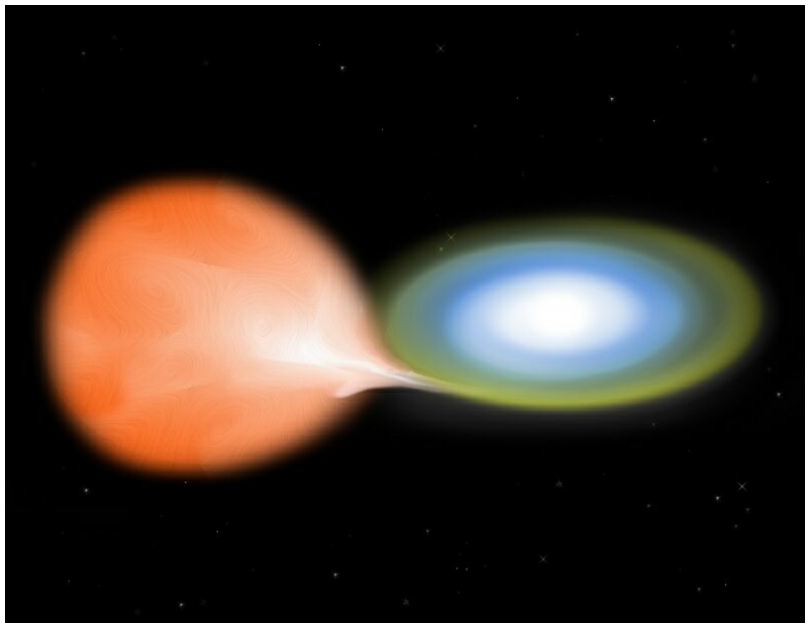
a ***neutron star***, or perhaps a ***black hole***



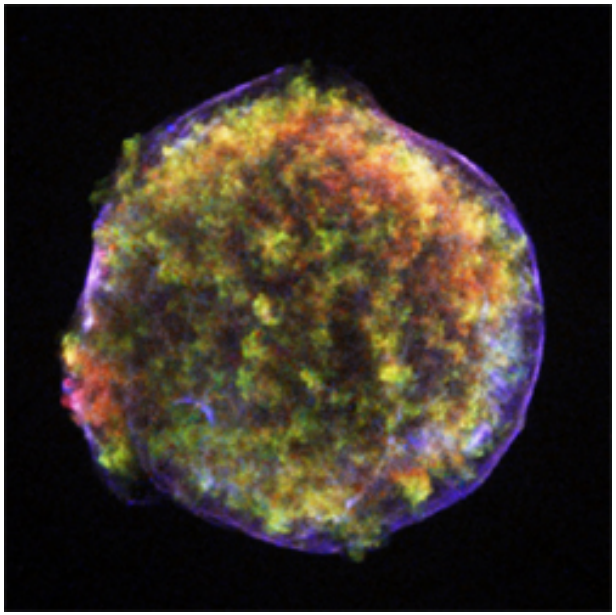


The mechanism of the explosion is still a mystery.

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.

Goal:

To understand what we have learned from the study of old supernova explosions in our Milky Way Galaxy.

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. (WD = White Dwarf; NS = Neutron Star)

SN 185	earliest record	No NS	WD
SN 386		NS, jet?	massive
SN 1006	brightest	No NS	WD
SN 1054	Crab Nebula	NS, jets	massive
SN 1181	(Radio Source 3C58)	NS, jets	massive
SN 1572	Tycho	No NS	WD
SN 1604	Kepler	No NS	WD
~1680	Cas A	NS? Jets	massive
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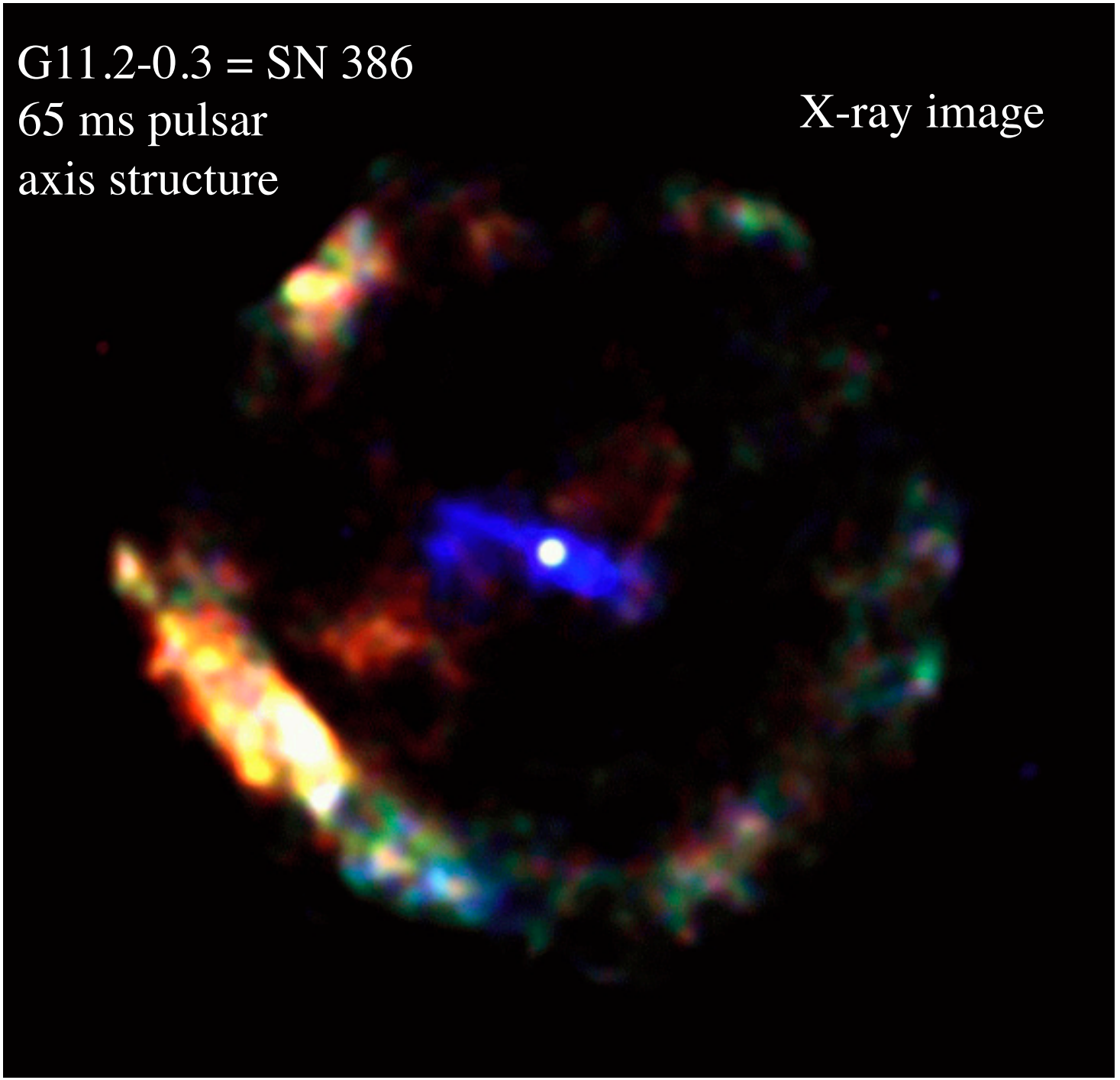
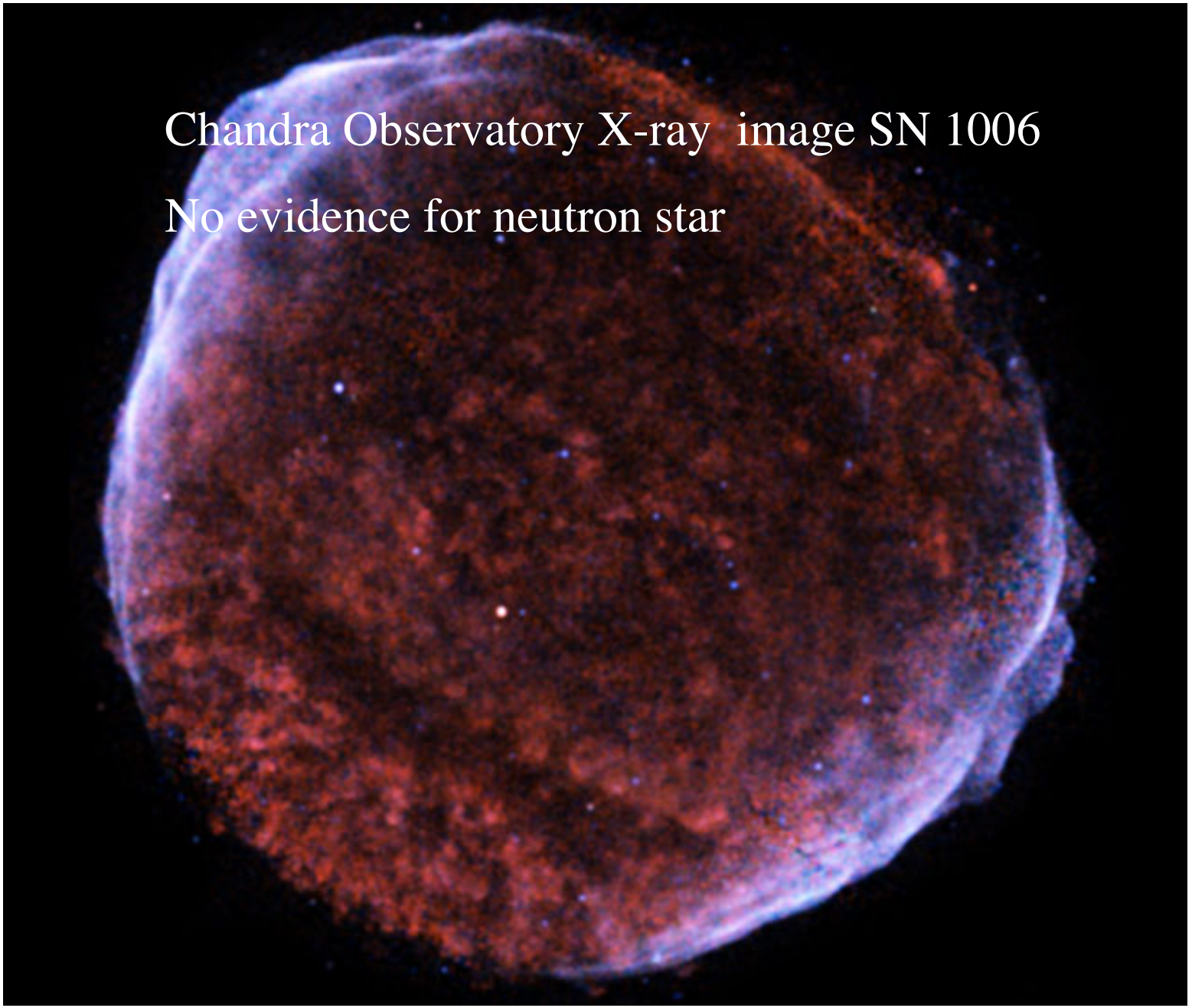
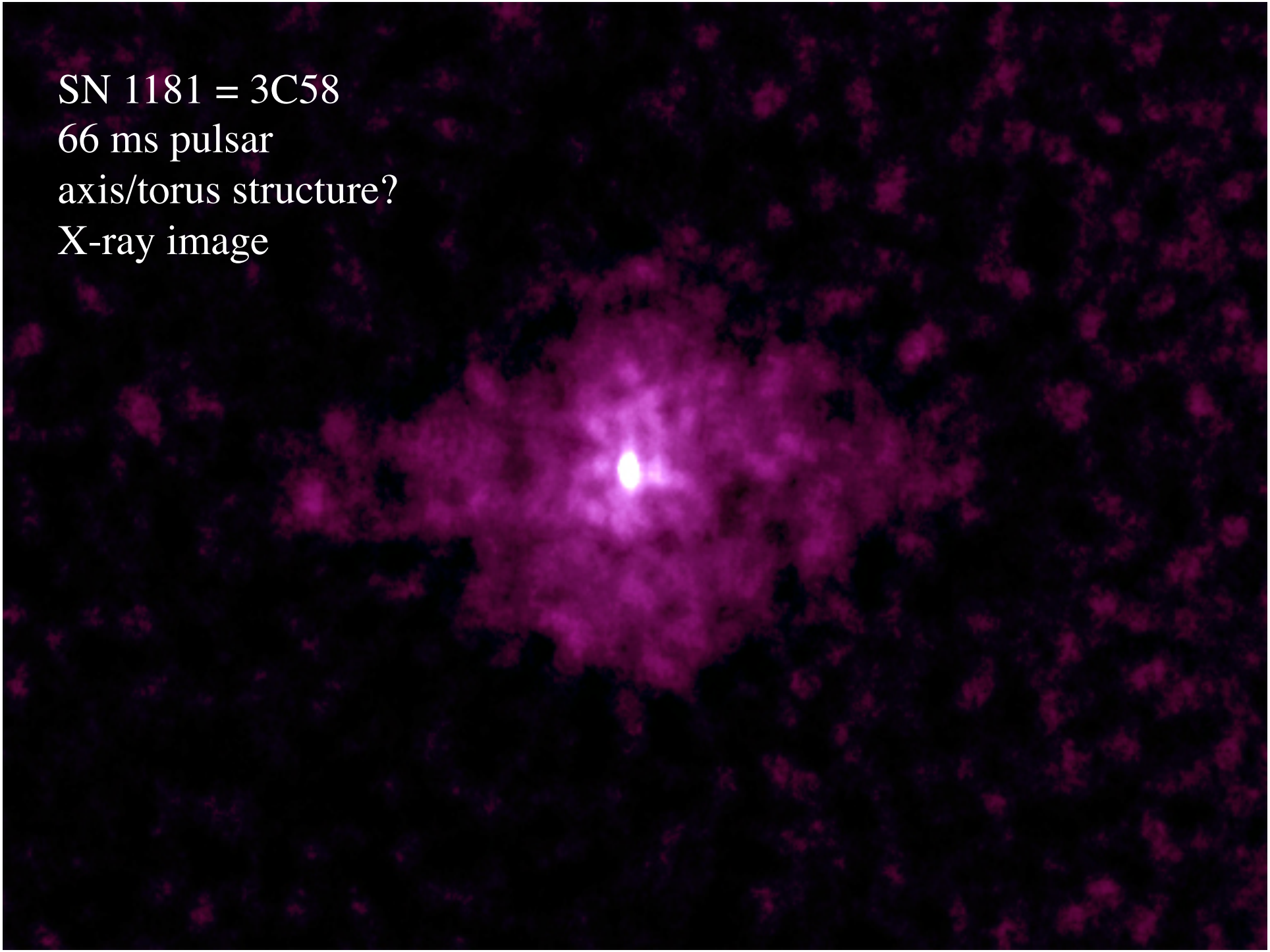
G1.9+0.3	latest? 140 years old	No NS	WD
SN 1987A	nearby galaxy	NS? Jets	massive


Chandra Observatory X-ray image, Spitzer, WISE infrared image
SN 185 = RCW 86
No evidence for neutron star


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

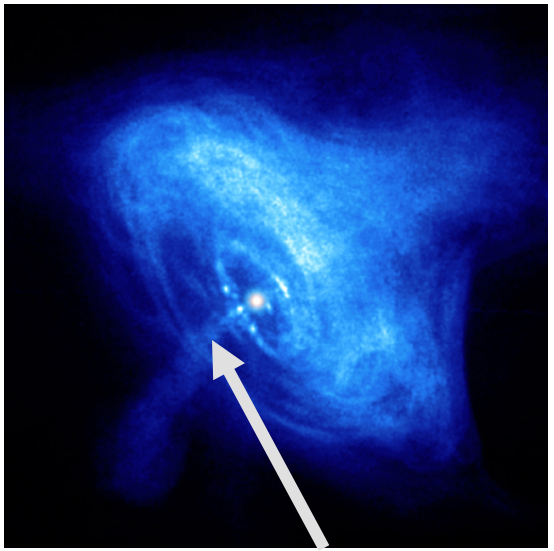

SN 1181 = 3C58
66 ms pulsar
axis/torus structure?
X-ray image

Crab Nebula

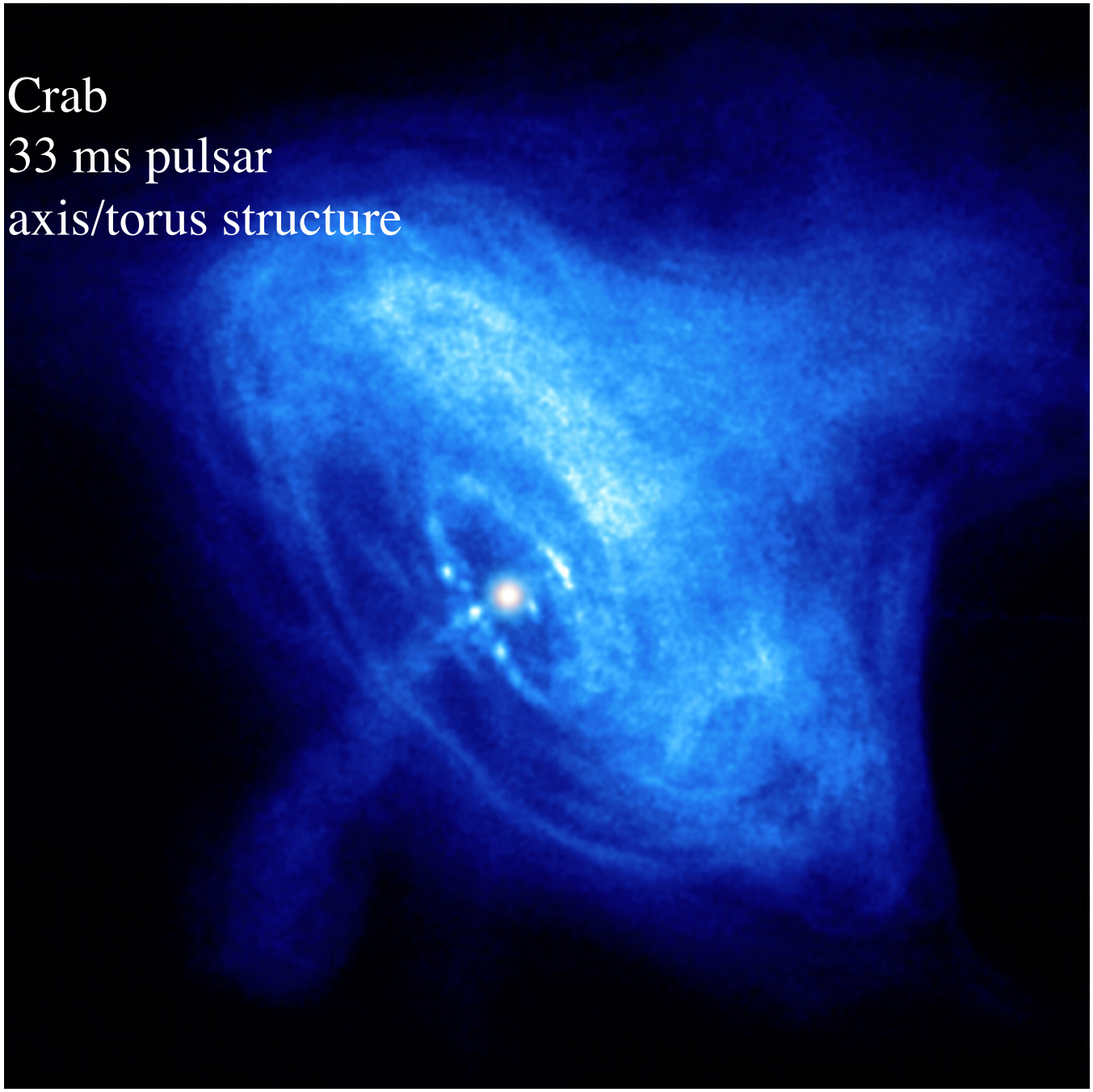
Remnant of "Chinese" Guest Star of 1054

Optical Image

Chandra Observatory
X-Ray Image



Left-over jet

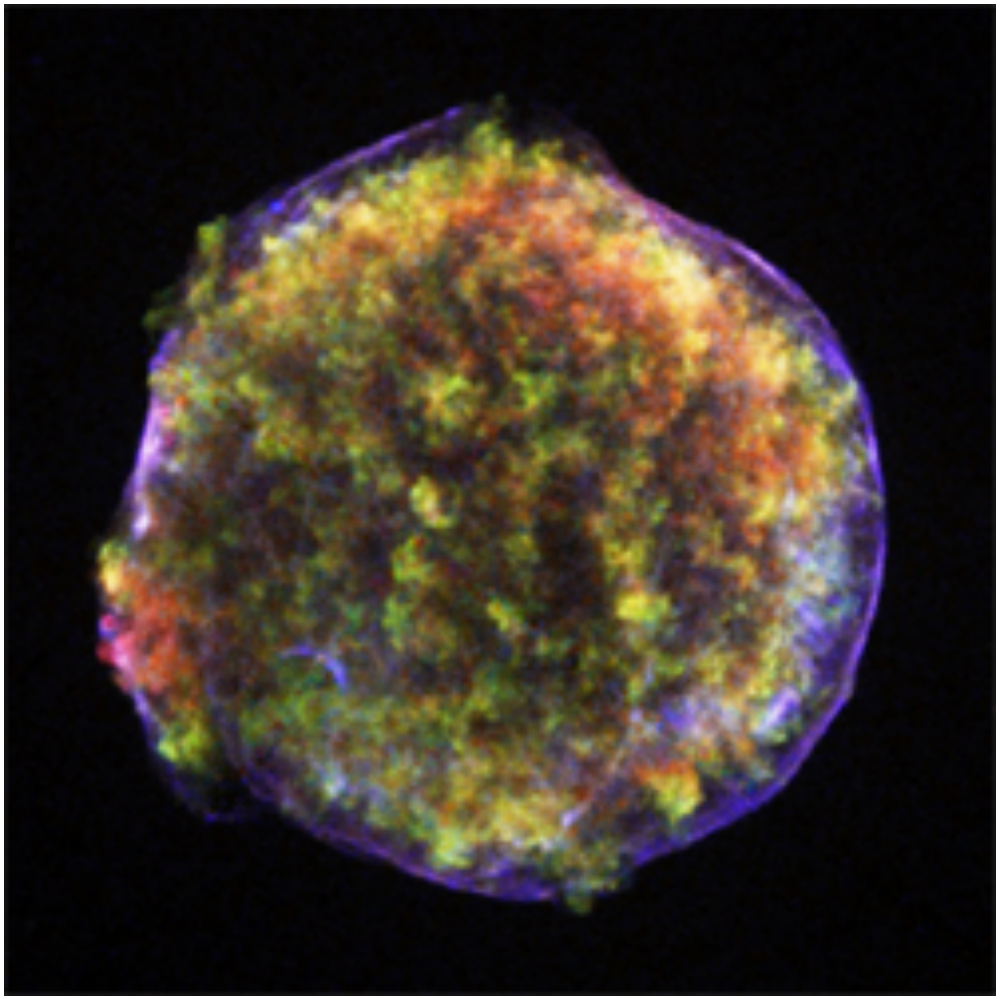

Crab
33 ms pulsar
axis/torus structure

Kepler

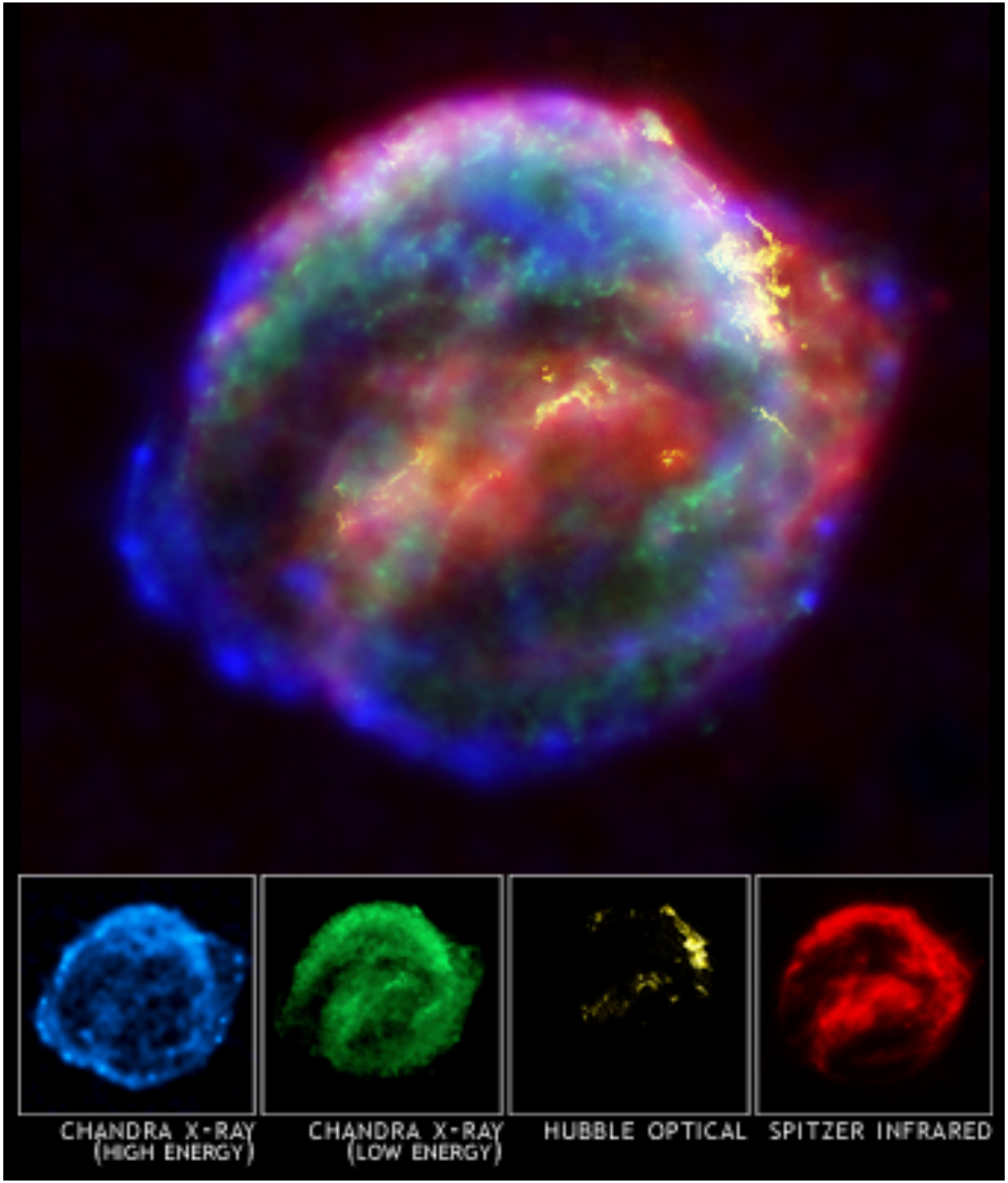
Tycho

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

No evidence for neutron star



SN 1006

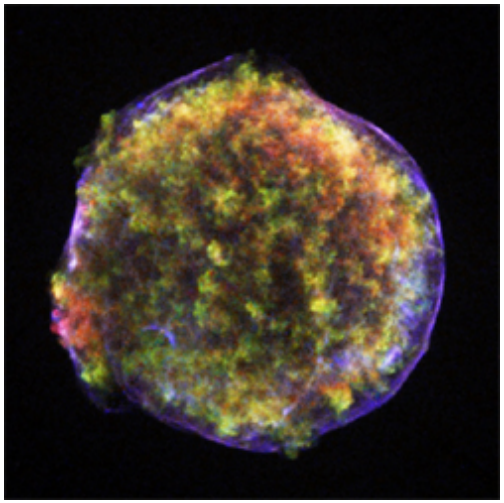


Great Observatories composite of Kepler's supernova 1604

No sign of neutron star

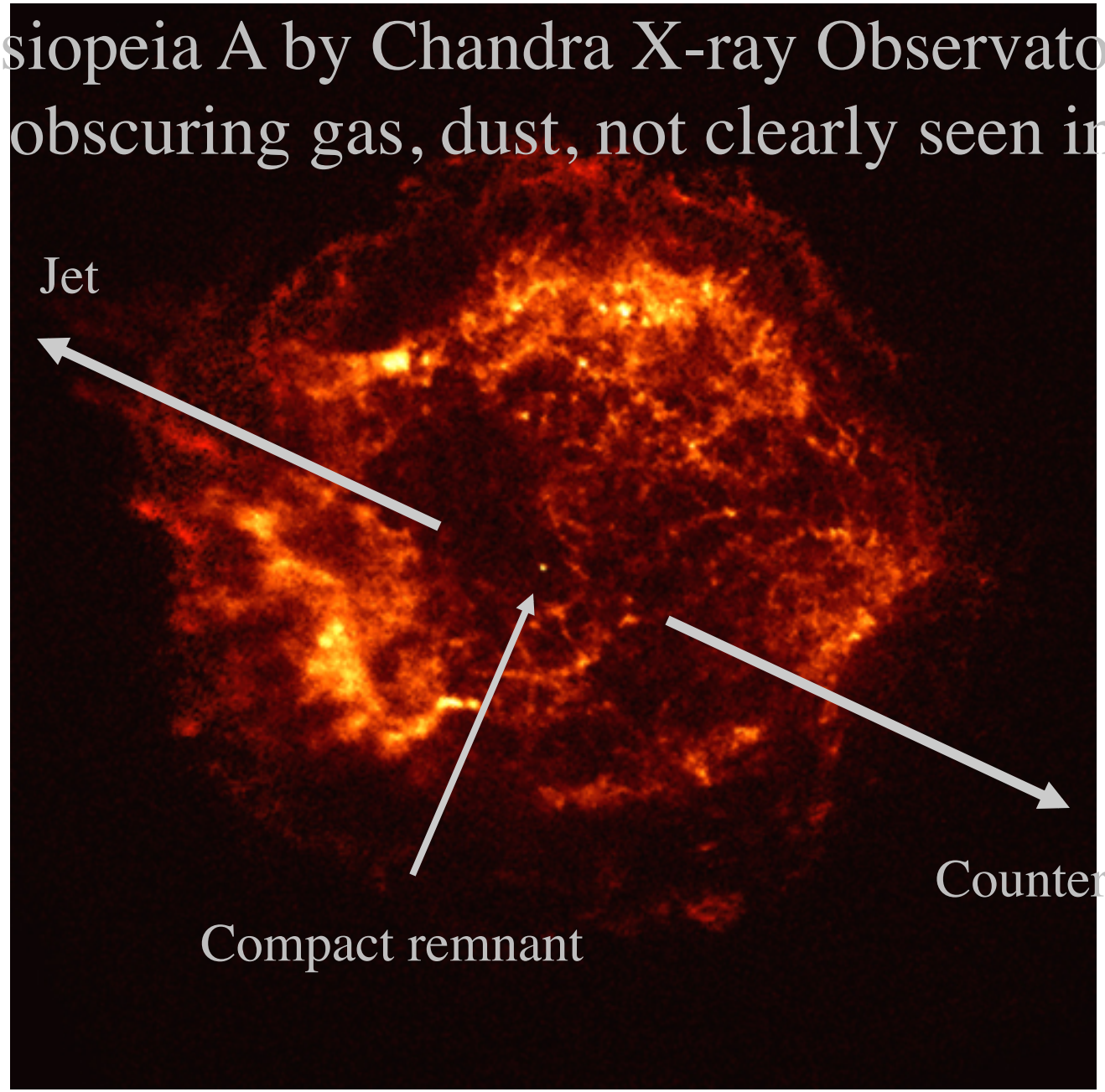
"sideways" alignment?

SN 1572 Tycho

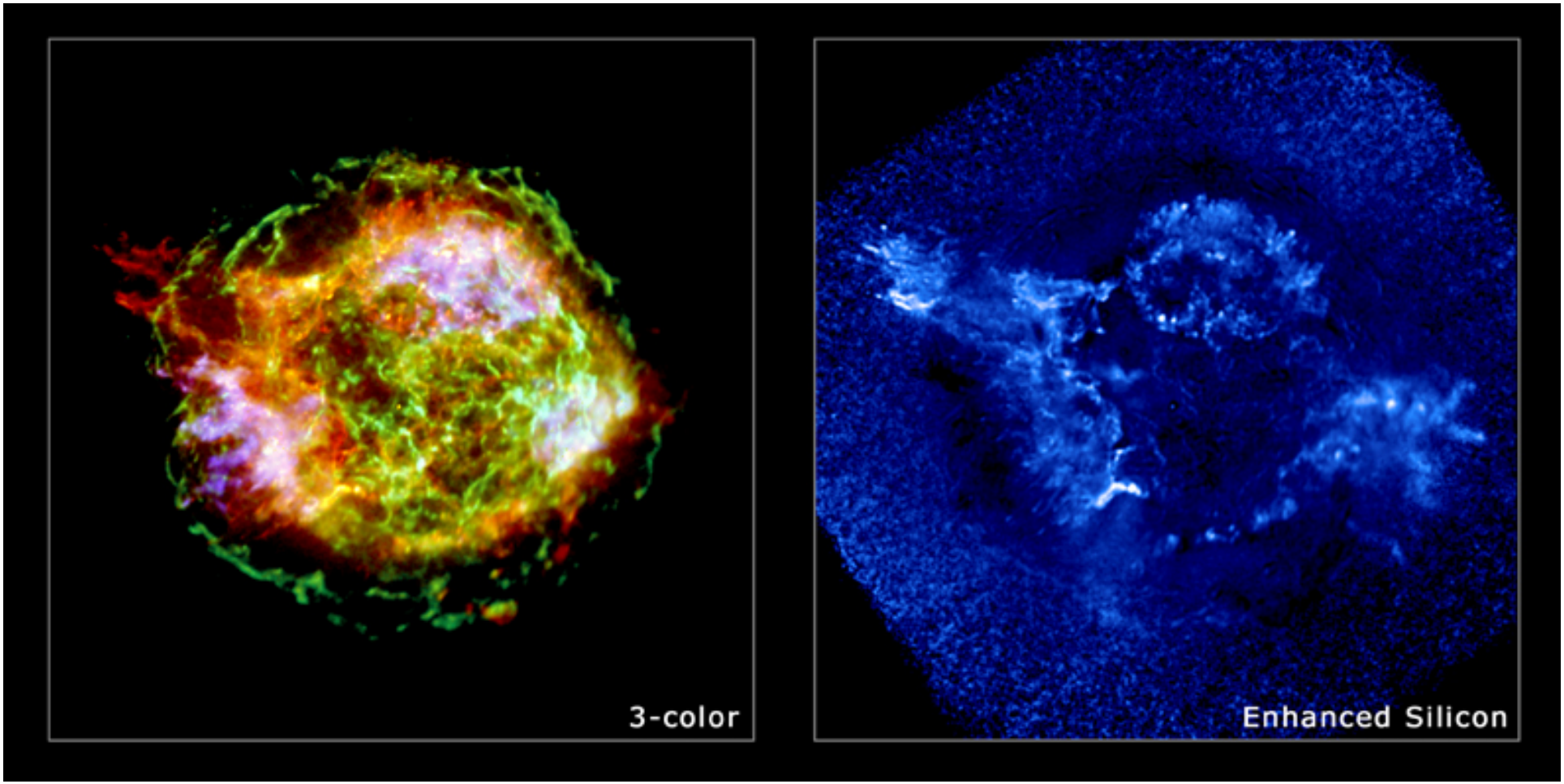


Cassiopeia A by Chandra X-ray Observatory

Behind obscuring gas, dust, not clearly seen in ~ 1680



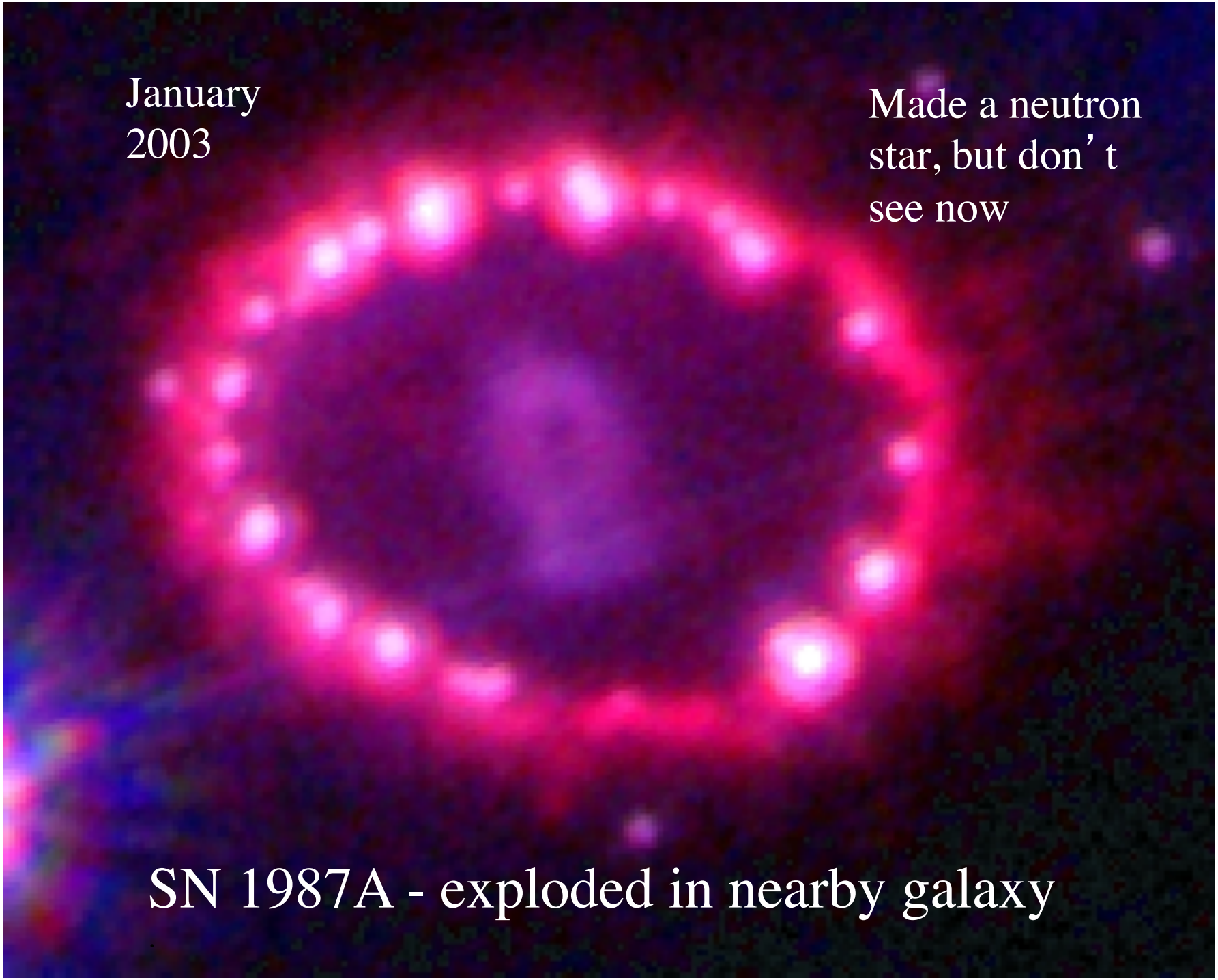
Chandra Observatory X-ray Image of Cas A



Chandra Observatory X-ray Image of G1.9+0.3

Youngest supernova detected in the Milky Way ~ 140 years old. Exploded near center of Milky Way, obscured by gas, dust, original explosion not observed.

No evidence for neutron star


January
2003
Made a neutron star, but don't see now
SN 1987A - exploded in nearby galaxy

Sky Watch Extra Credit - location of Galactic (Milky Way) supernovae

SN 185 – Circinus/Centaurus (direction of Alpha Centaurus)

SN 386 - Sagittarius

SN 1006 - Lupus/Centaurus (difficult this time of year)

SN 1054 Crab Nebula - Taurus

SN 1181 – Cassiopeia

SN 1572 Tycho - Cassiopeia

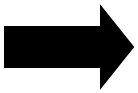
SN 1604 Kepler - Ophiuchus

Cassiopeia A – Cassiopeia

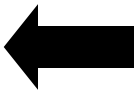
G1.9+0.3 – Sagittarius

One Minute Exam

The Crab Nebula supernova of 1054 shows a neutron star in its center. This suggests that:



It formed in a double-star system



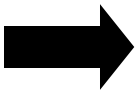
It was formed by the collapse of a massive star

It was formed by an exploding white dwarf

It actually exploded much earlier than 1054

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