Thursday, March 5, 2009

Reading: Chapter 7, SN 1987A

Movies posted on web site

Second exam next Thursday, Review sheet Monday, Review Wednesday

Turn in next Sky Watch after Spring Break Tuesday, March 24

Astronomy in the News? Kepler satellite to be launched tomorrow. Will look for Earth-size planets.

Also Watchmen

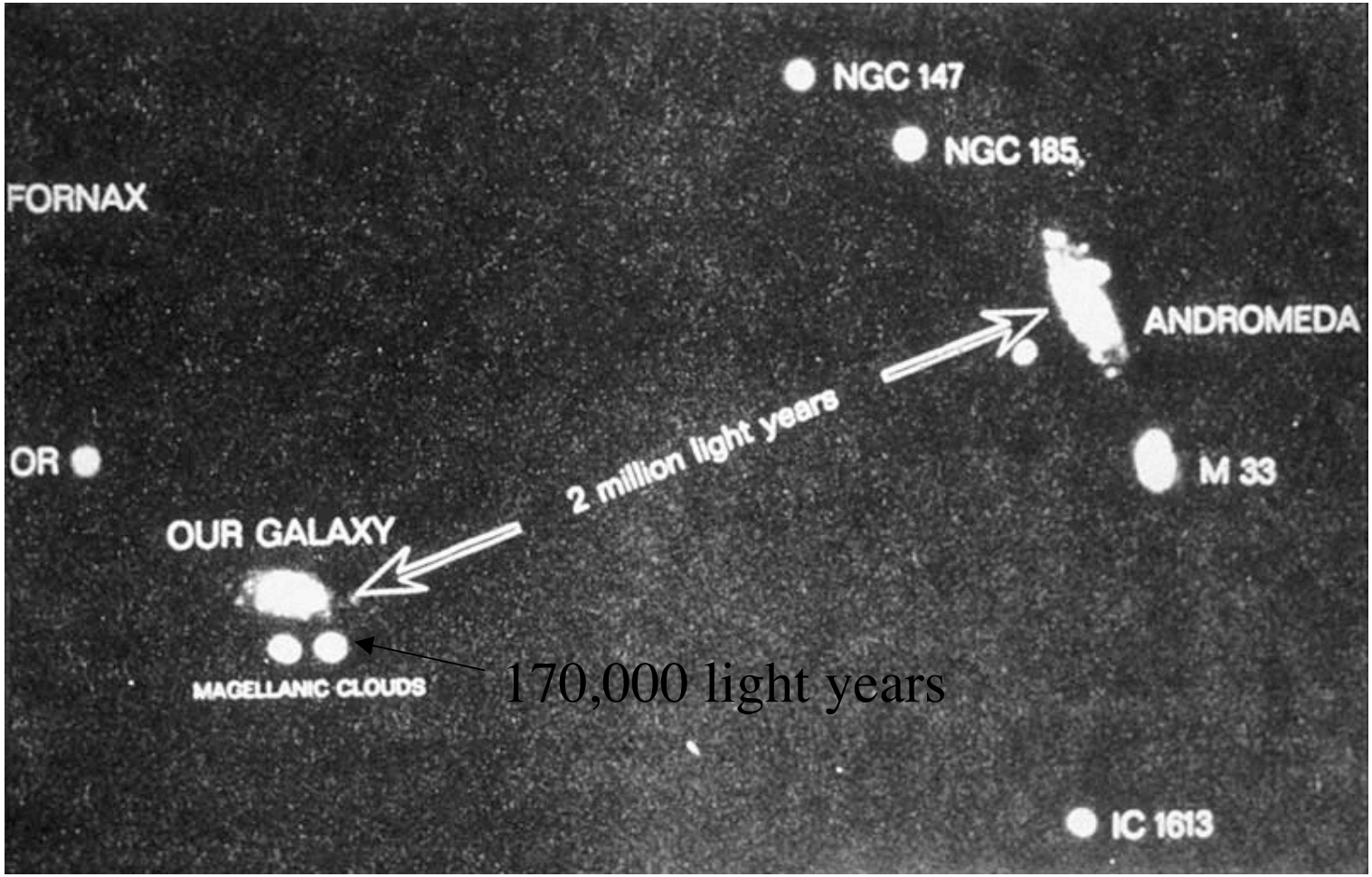
Pic of the Day - Cocoon Nebula, site of new star formation

Kepler

SN 1987A
first naked eye
supernova since
Kepler's in
1604

Tycho

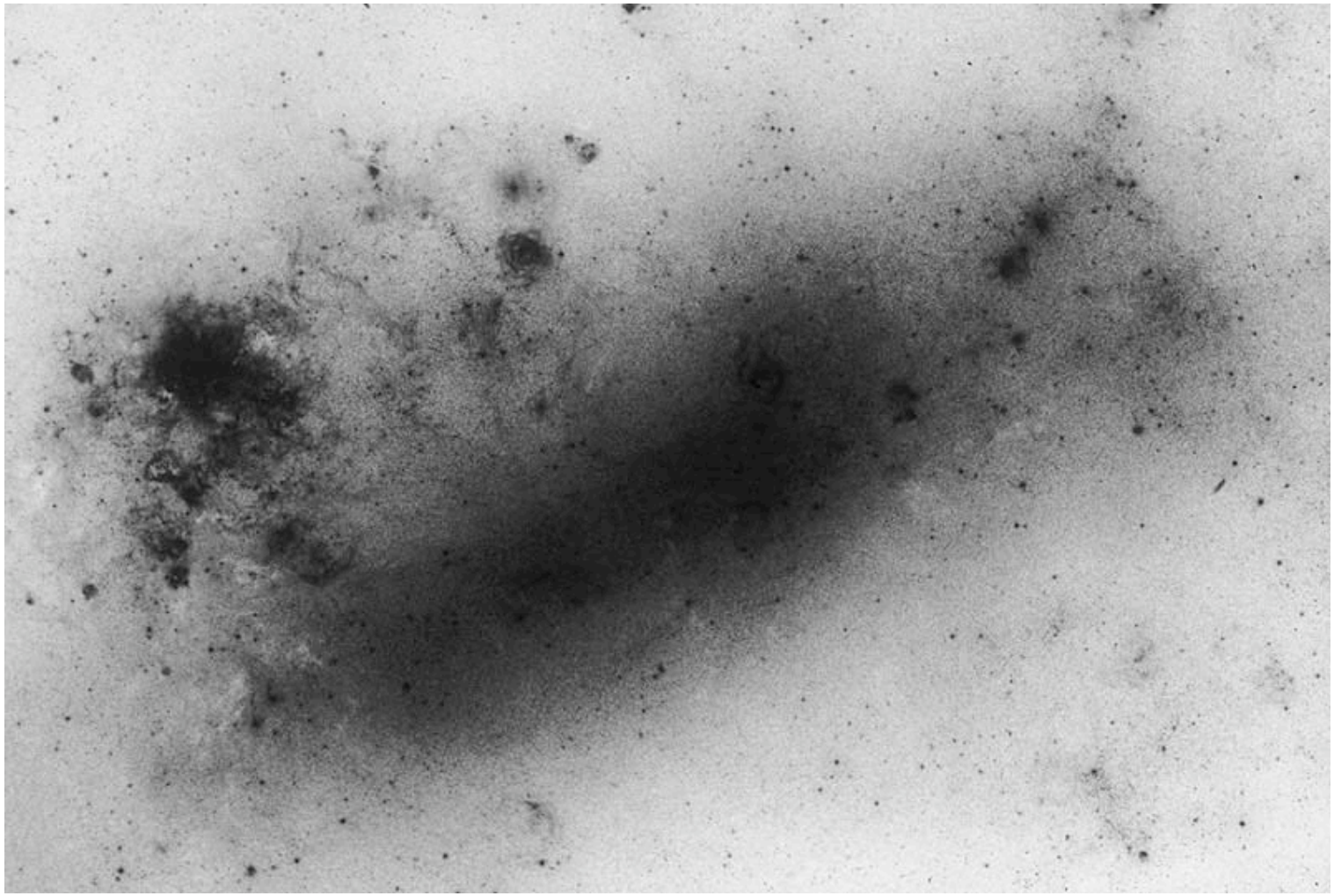
Local group


NGC 147
NGC 185
FORNAX
ANDROMEDA
OR
2 million light years
M 33
OUR GALAXY
MAGELLANIC CLOUDS
170,000 light years
IC 1613

Large Magellanic Cloud, irregular galaxy (color)

Large Magellanic Cloud, larger scale

LMC negative



Rob McNaught patrol photos - the day before

2-22-87

The first known photo of SN 1987A hours after shock breakout

2-23-87

One day later

2-24-87

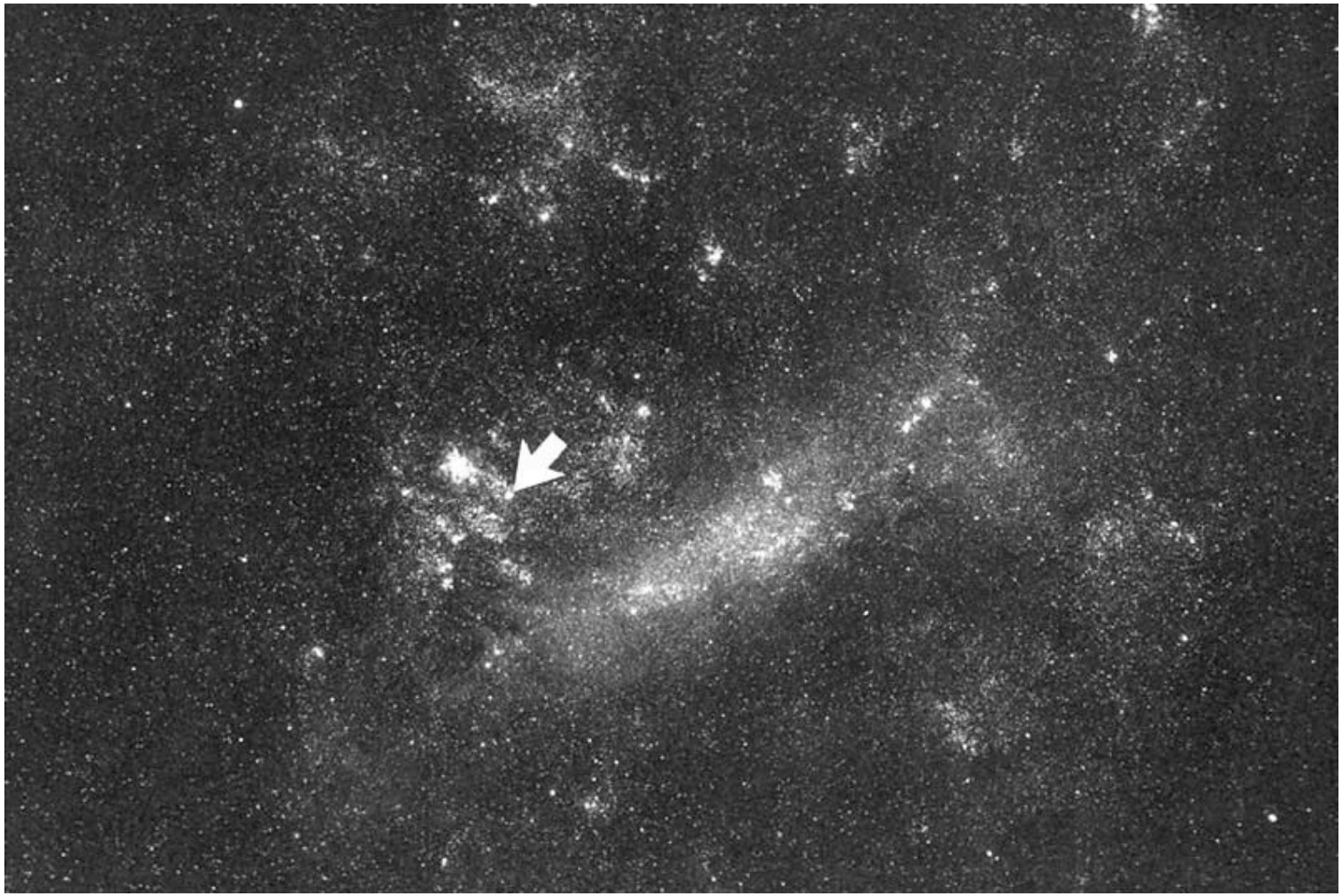
Near maximum light

5-20-87

About when I saw it

8-23-87

LMC w/arrow



One Minute Exam

When SN 1987A exploded, where would have been a good place to have seen it with your naked eye?

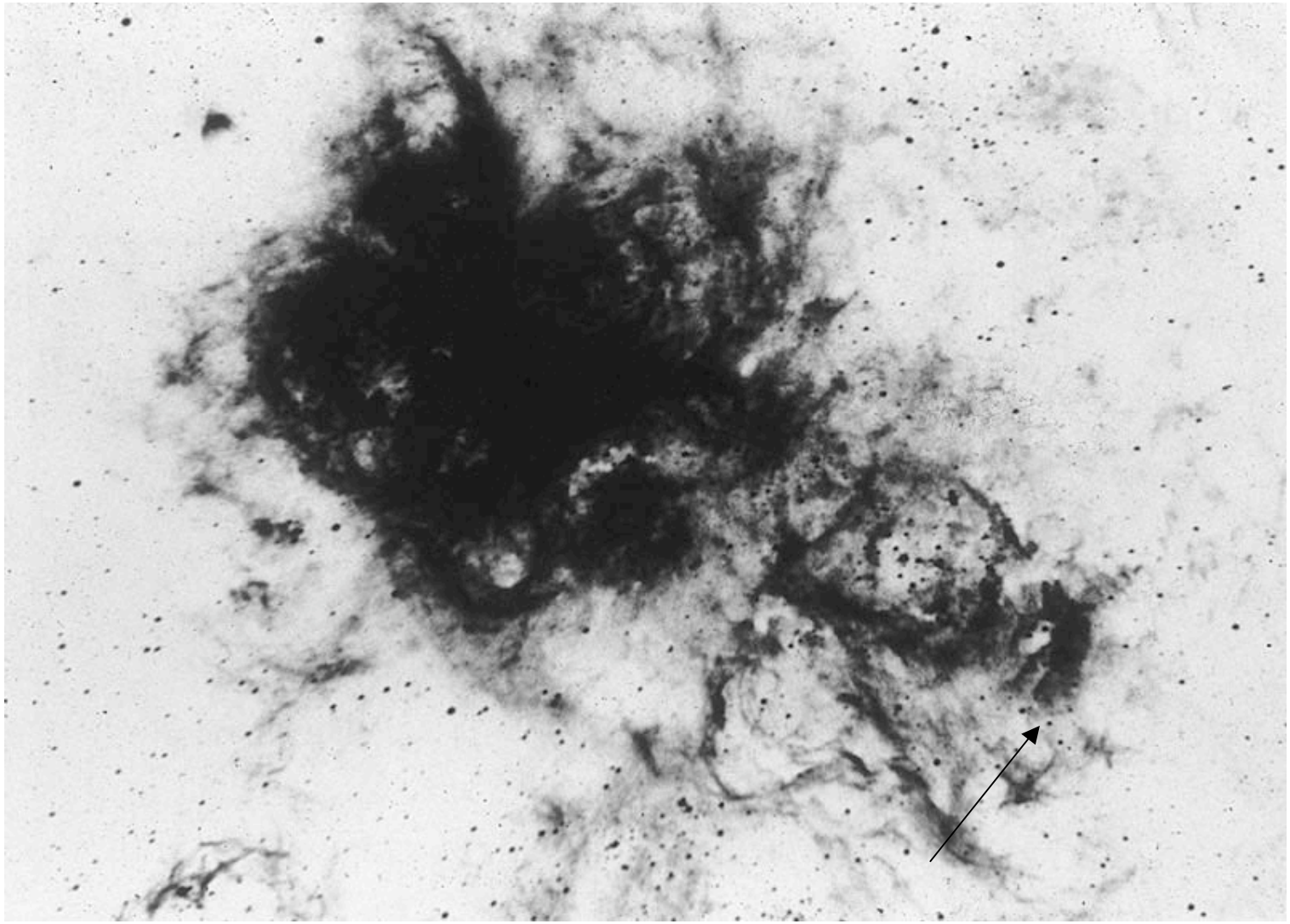
A) Texas

B) Japan

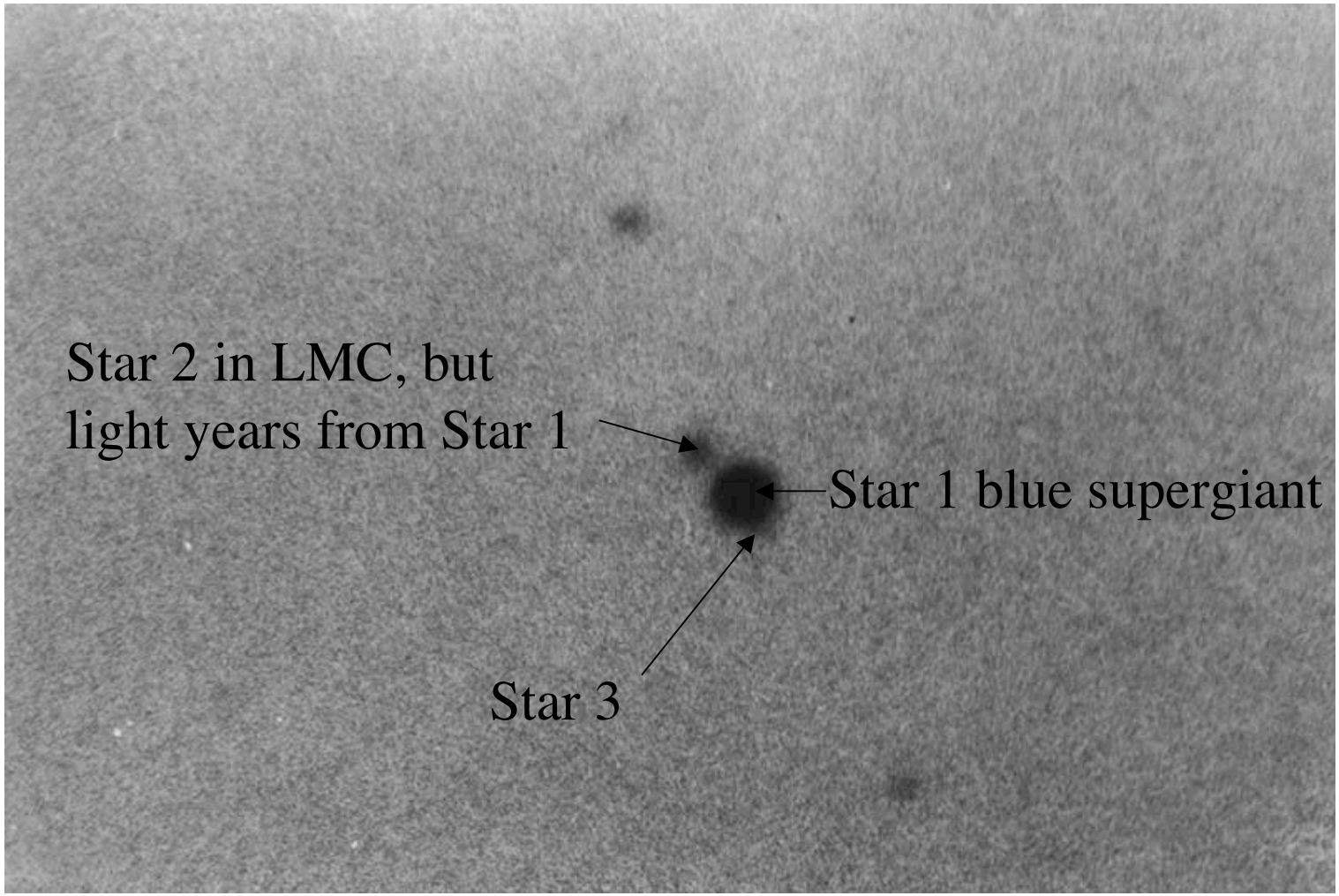
C) France

D) Argentina

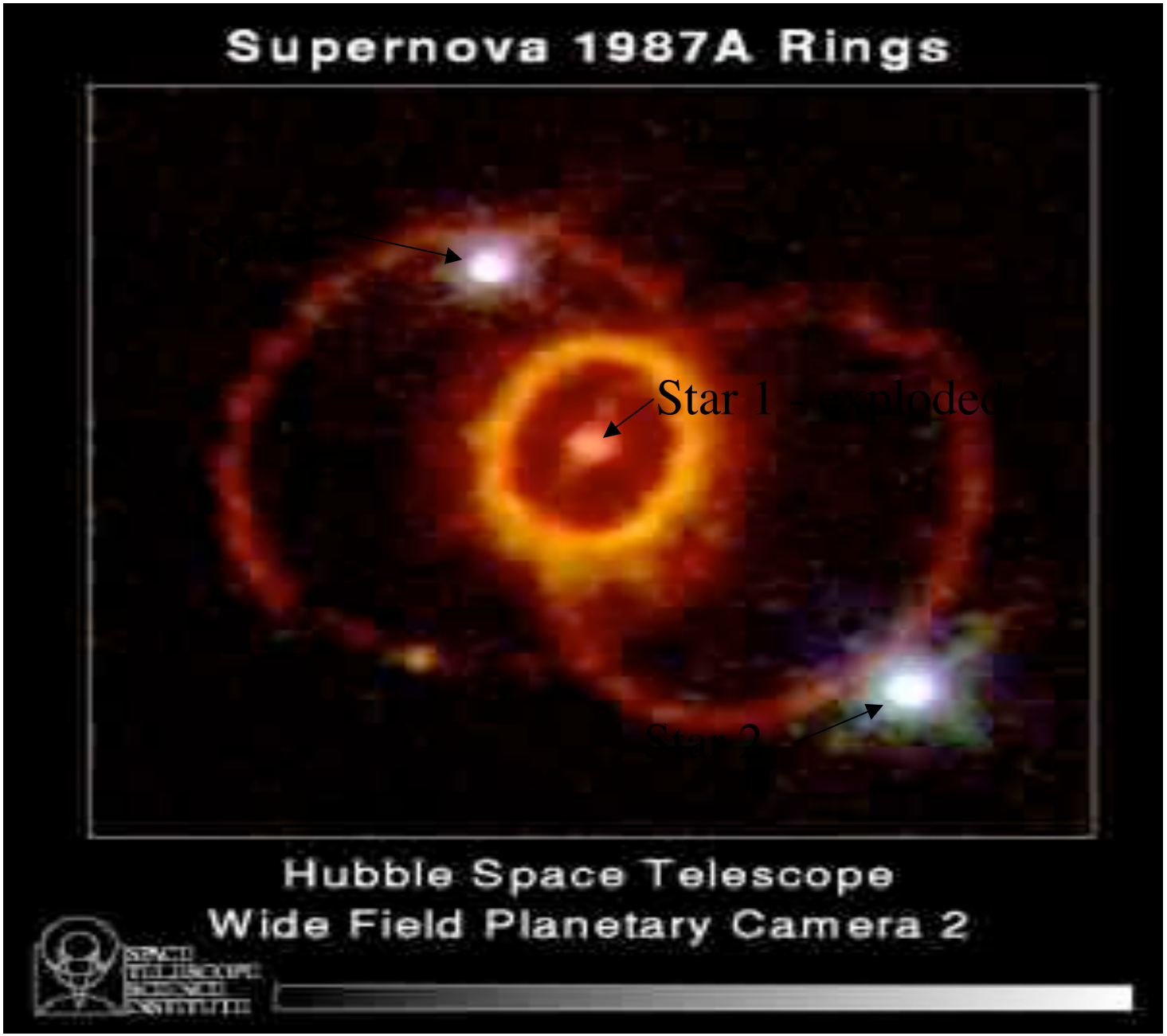
Photo of progenitor star (giraffe)

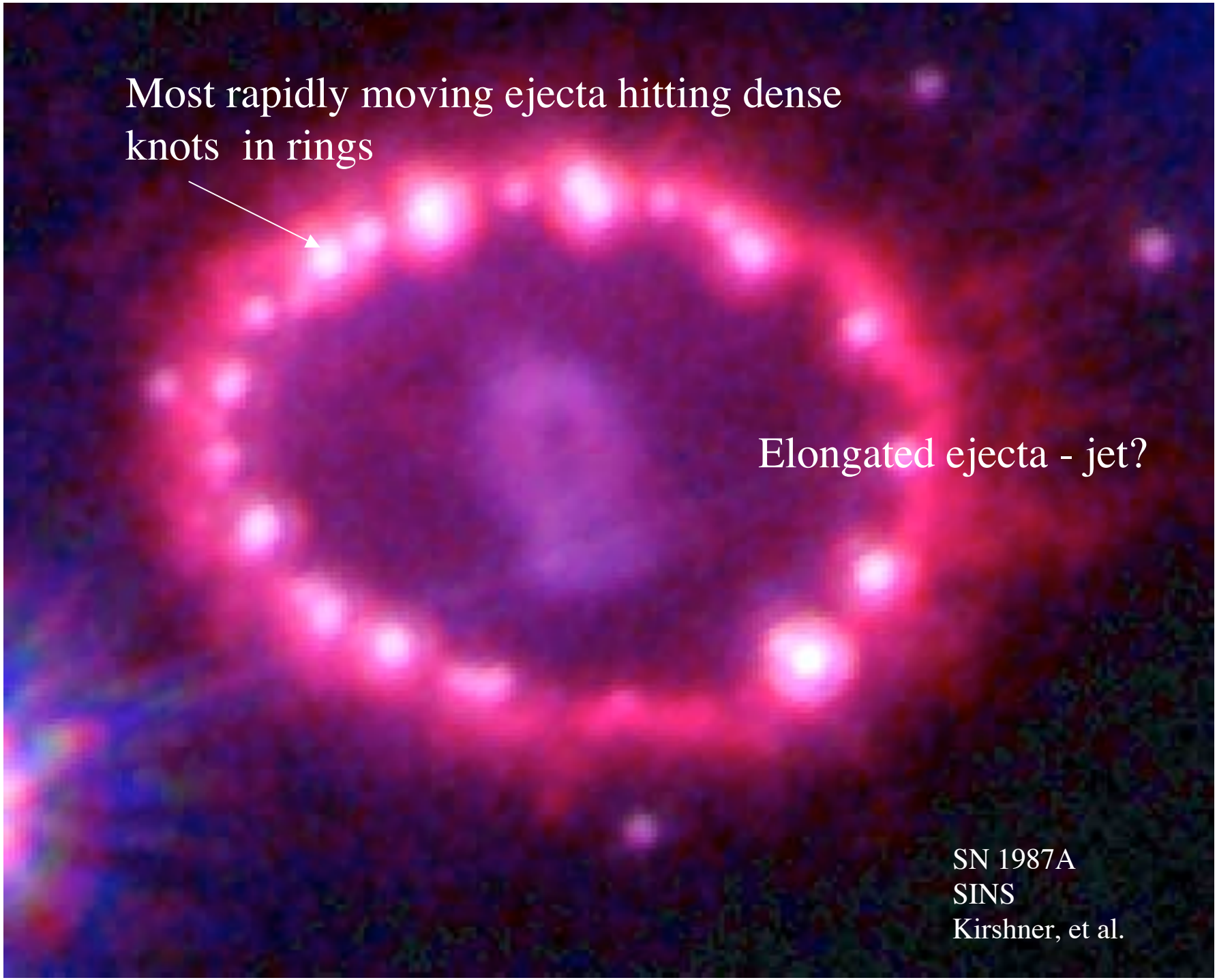


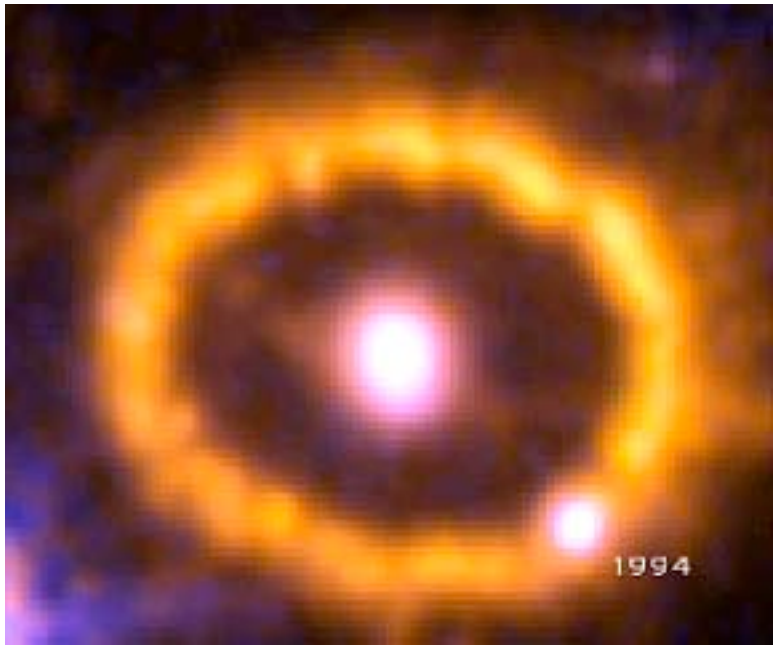
Stars 1, 2, 3

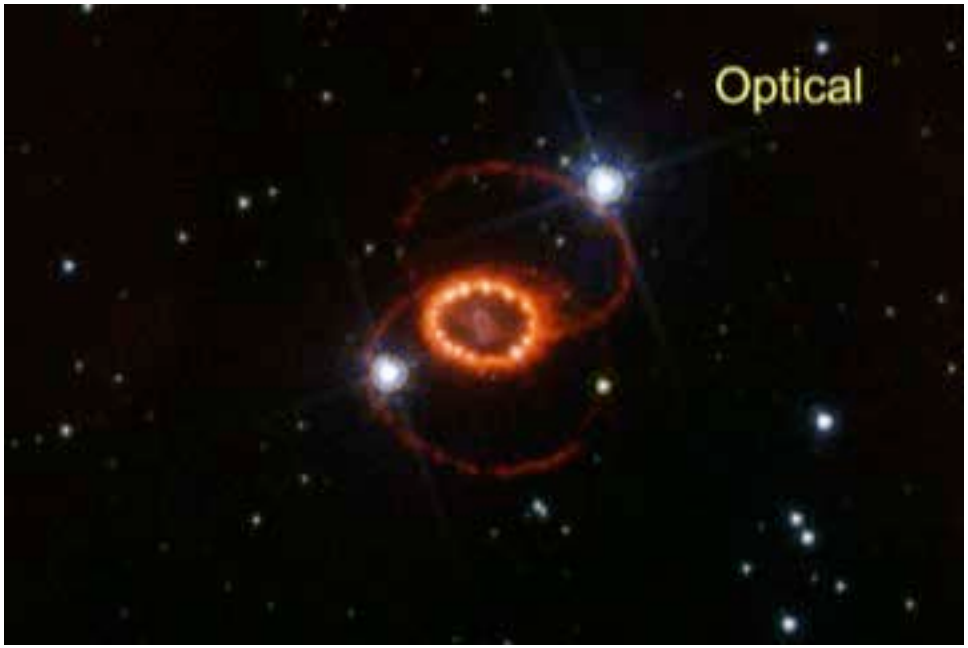


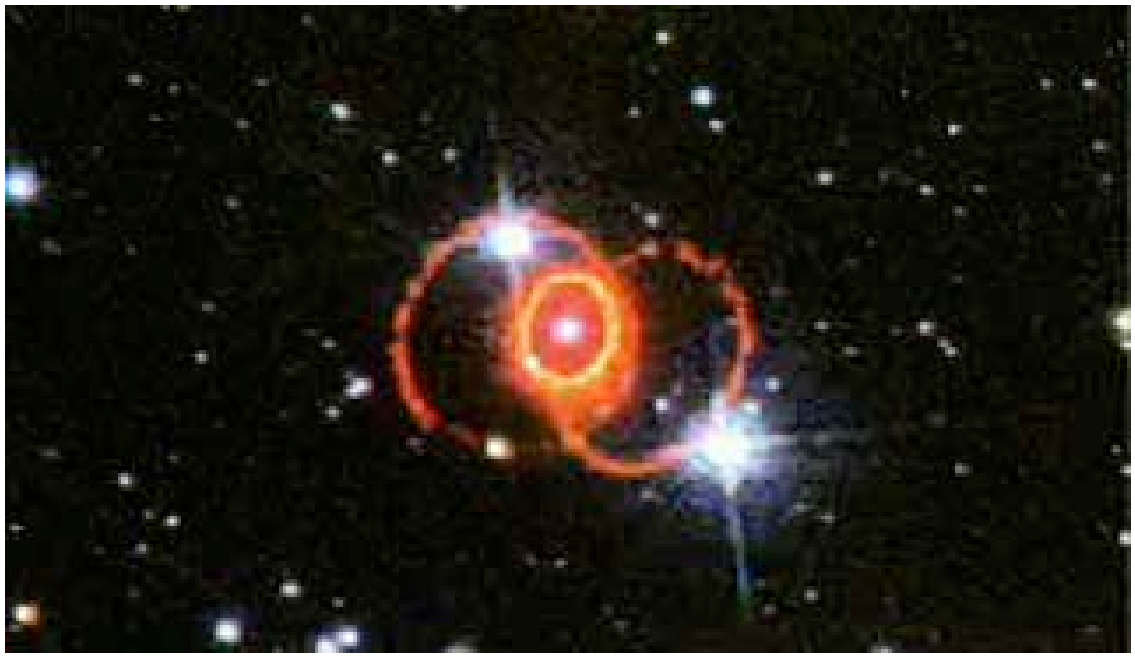
Close-up


Supernova 1987A Rings
Star 1 - exploded
Star 2
Hubble Space Telescope
Wide Field Planetary Camera 2


Most rapidly moving ejecta hitting dense knots in rings
Elongated ejecta - jet?
SN 1987A
SINS
Kirshner, et al.


1994


Optical



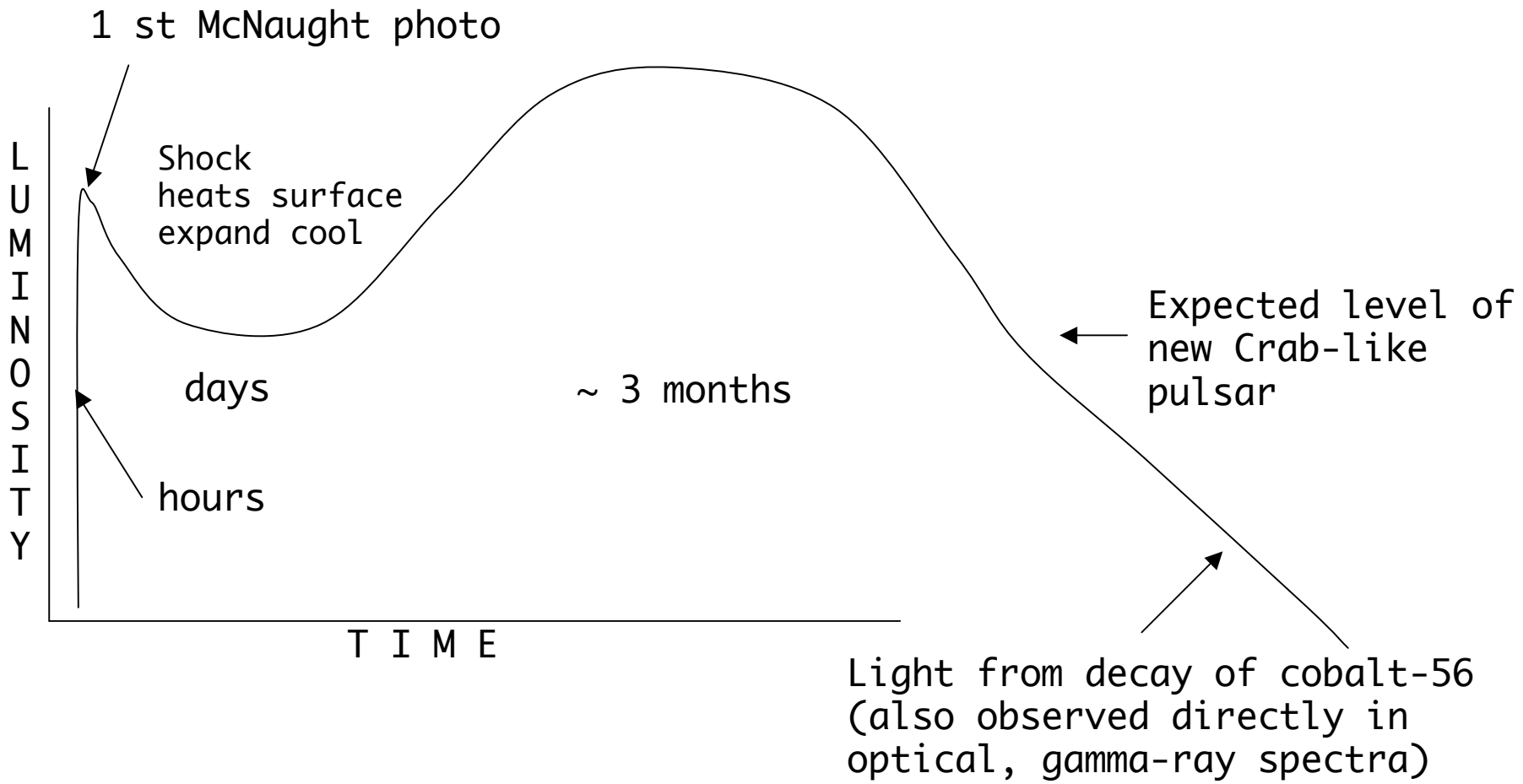
The single most important thing about SN 1987A is that we detected the neutrinos!

It was definitely a core-collapse event

10^{57} neutrinos emitted, most missed the Earth. Of those that hit the Earth, most passed though since neutrinos scarcely interact.

About 19 neutrinos were detected in a 10 second burst.

170,000 year history!

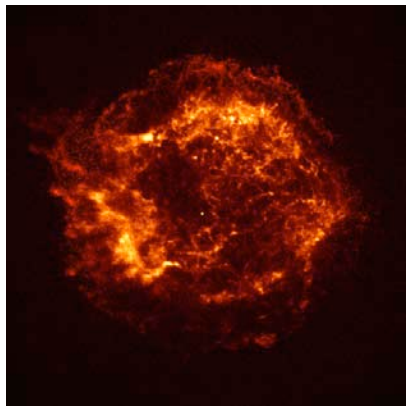


SN 1987A had a rather peculiar light curve because it was a relatively compact blue supergiant, not a red supergiant, brief shock heating, rapid cooling by expansion, no plateau, subsequent light all from radioactive decay

Neutrinos from SN 1987A proved a neutron star formed and lasted for at least 10 seconds while neutrinos were detected - where is it?

Expected to see it in ~ 1 year - still looking 22 years later

Any neutron star is dimmer by at least a factor of 10 than 1000 year-old Crab pulsar



If similar to object in Cas A, much too dim to detect
100 to 1000 × dimmer than Crab pulsar

Possibly black hole, not neutron star??
Don't know. Can't rule out.

Neutron star could be "hidden," or a slow rotator, or with a weak magnetic field, but counter to notion of jet - some evidence for jet, pr a very strong magnetic field that would radiate and slow it down quickly.

End of Material for Test 2