Wednesday, March 8, 2017

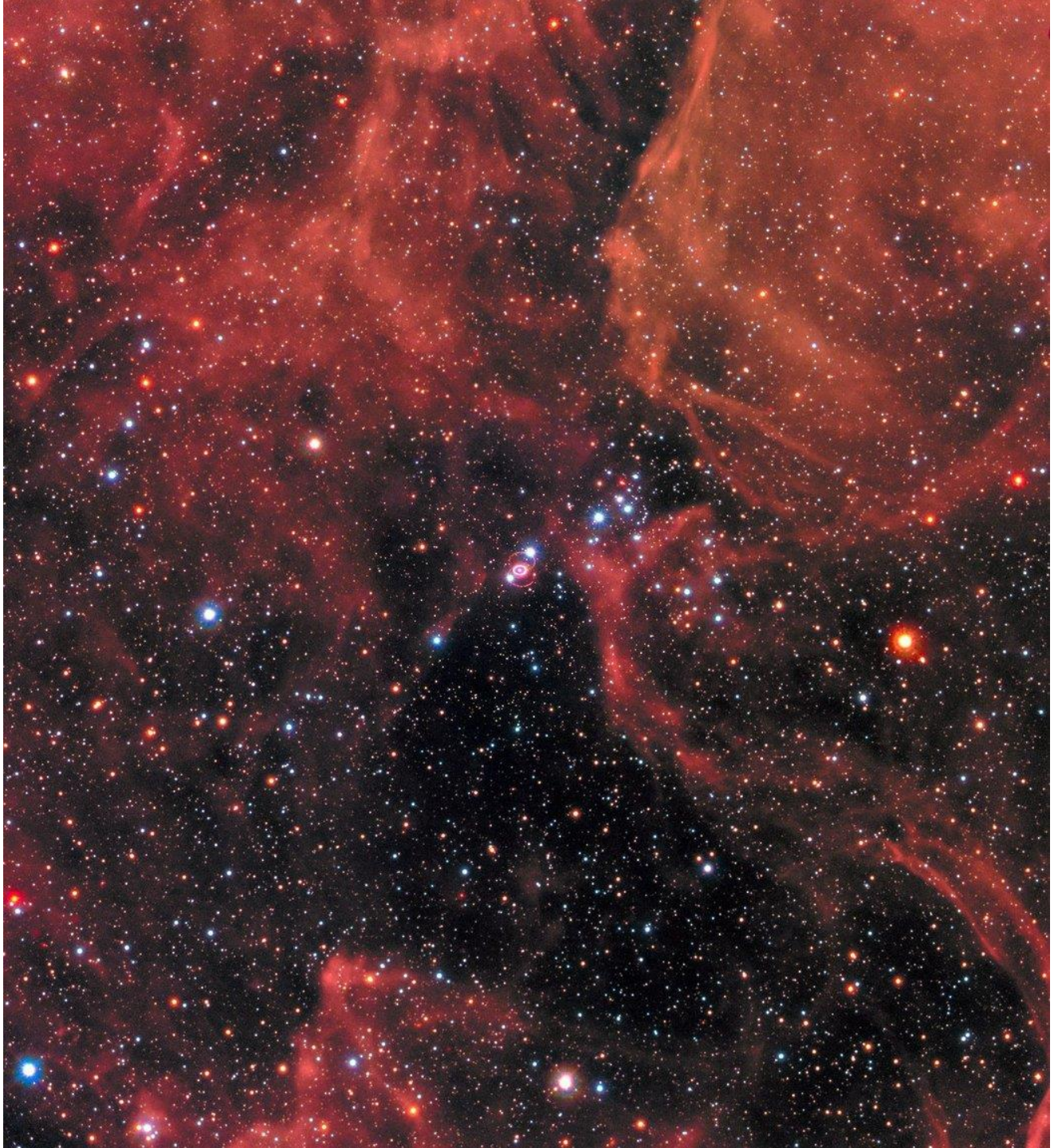
Reading for Exam 3:

Chapter 6, end of Section 6 (binary evolution), Section 6.7 (radioactive decay), Chapter 7 (SN 1987A), Background: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.8, 3.10, 4.1, 4.2, 4.3, 4.4, 5.2, 5.4 (binary stars and accretion disks).

Astronomy in the news?

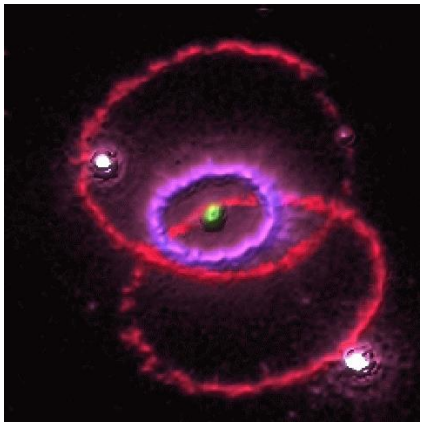
New York Times Science Section yesterday, bit on SN 1987A.
Photo next slide, new Hubble Telescope image.

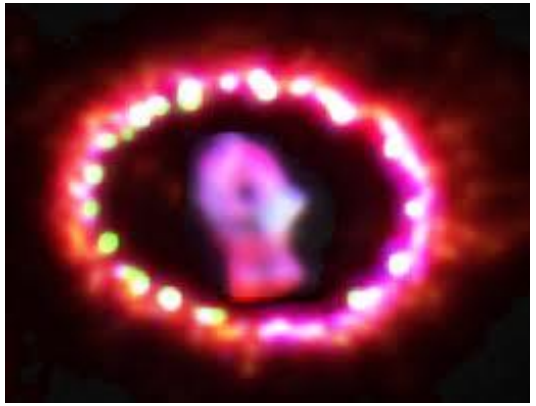
Image of SN 1987A and environs in Large Magellanic Cloud, taken by Hubble Space Telescope, January 2017



Goal:

To understand the nature and importance of SN 1987A for our understanding of massive star evolution and iron core collapse. Chapter 7





Large Magellanic Cloud, closeup (color)

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

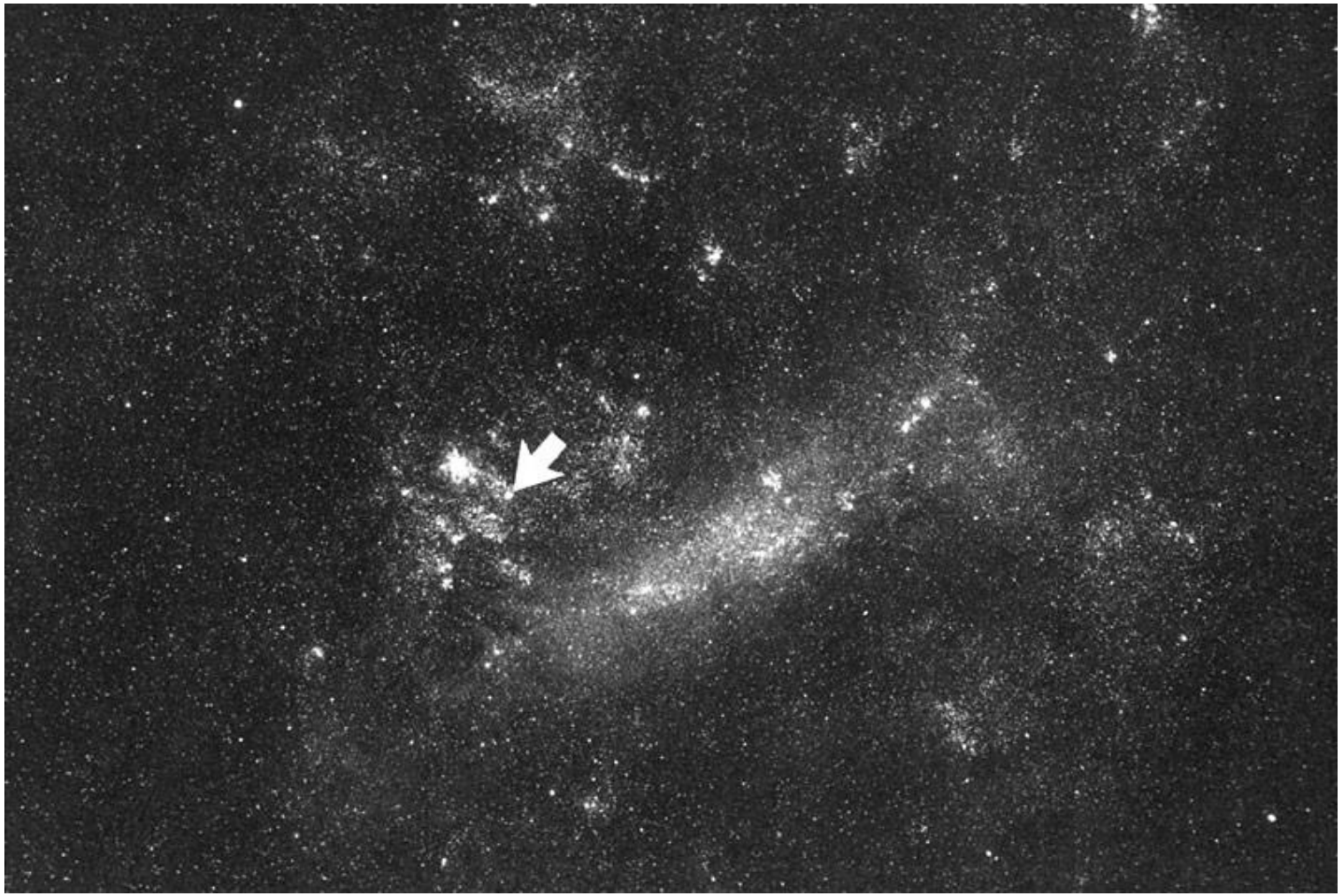
Near maximum light

5-20-87

About when I saw it

8-23-87

LMC w/arrow

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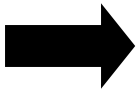
One Minute Exam

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

 Texas

 Japan

 Russia

 South Africa

LMC negative

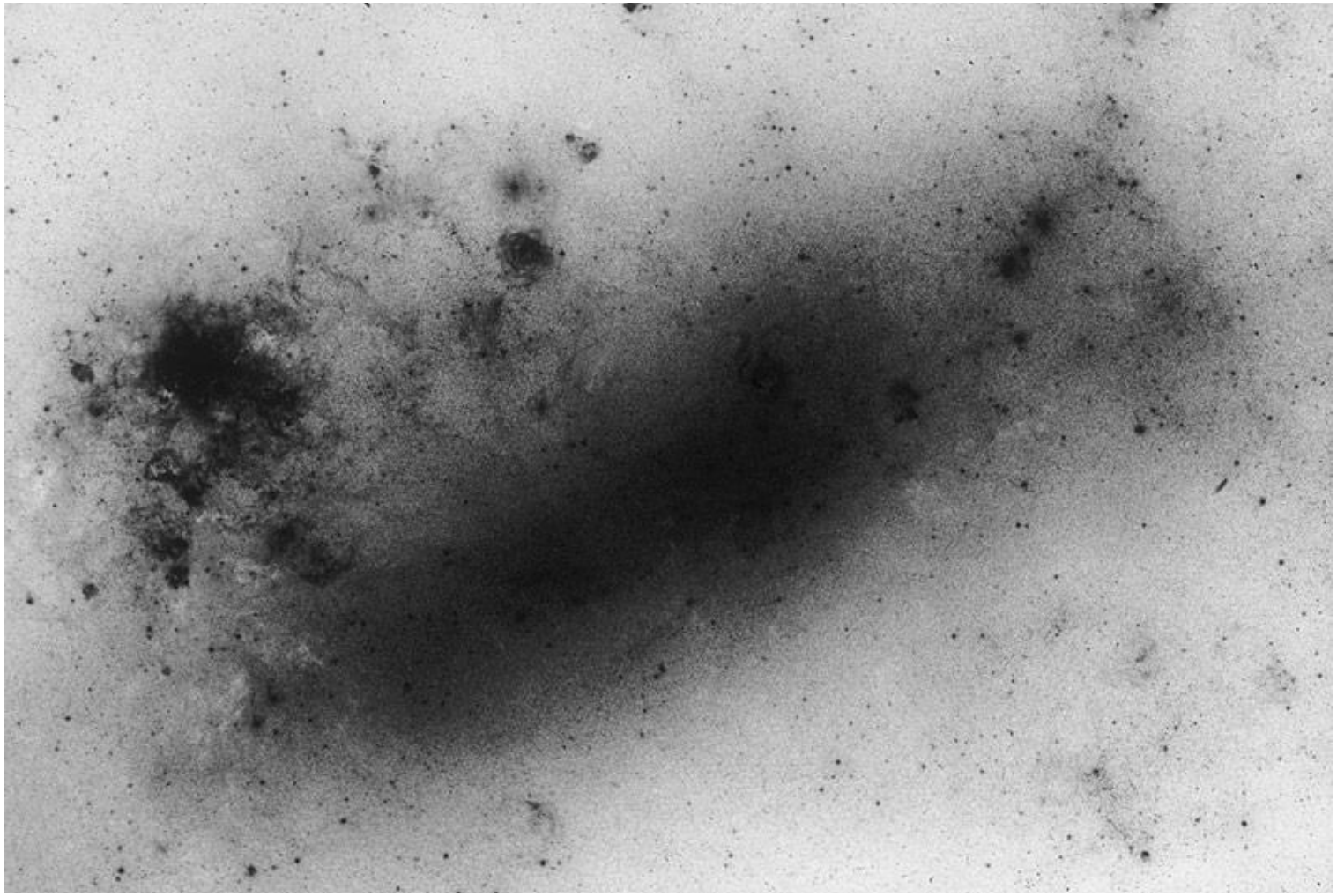
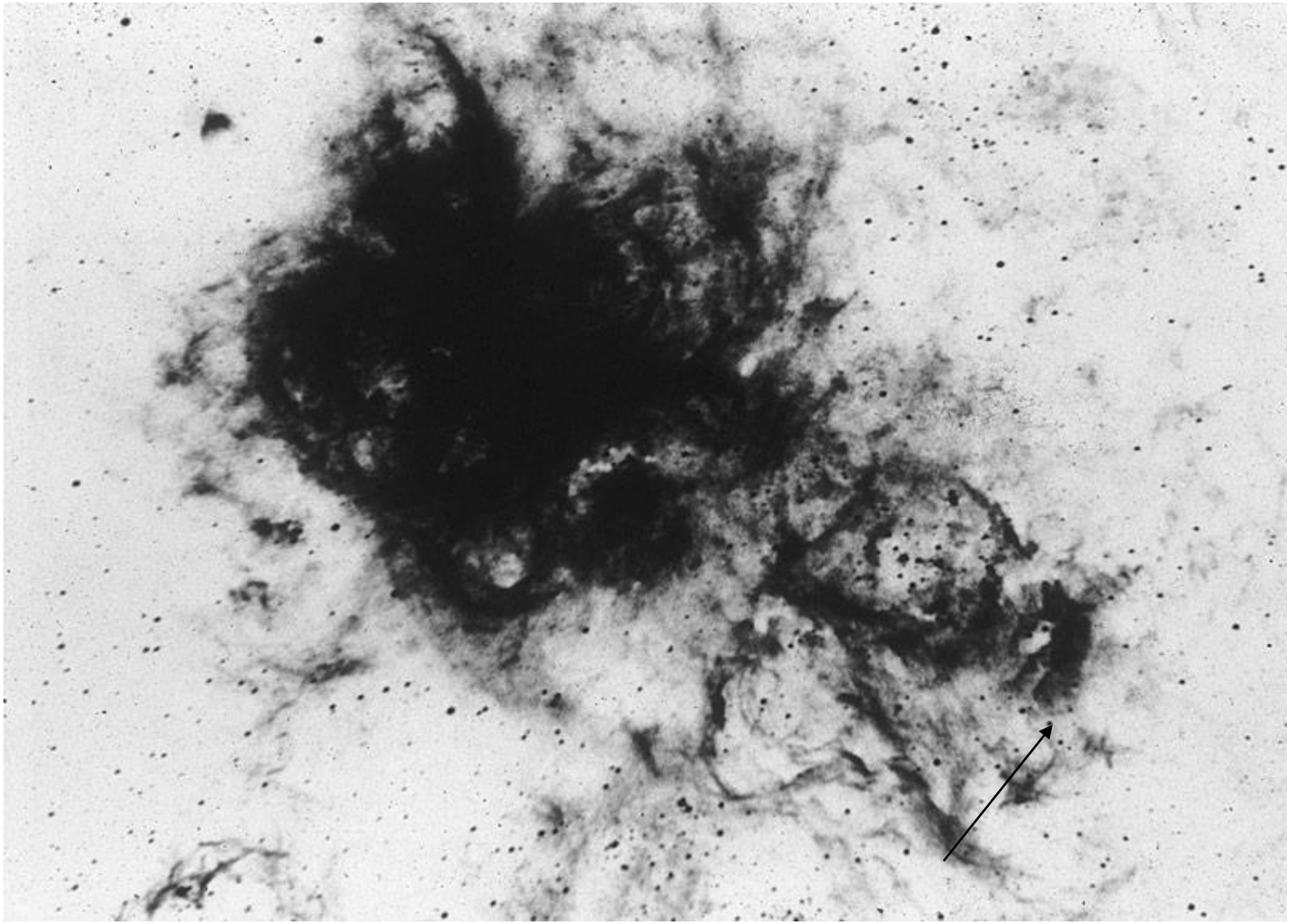
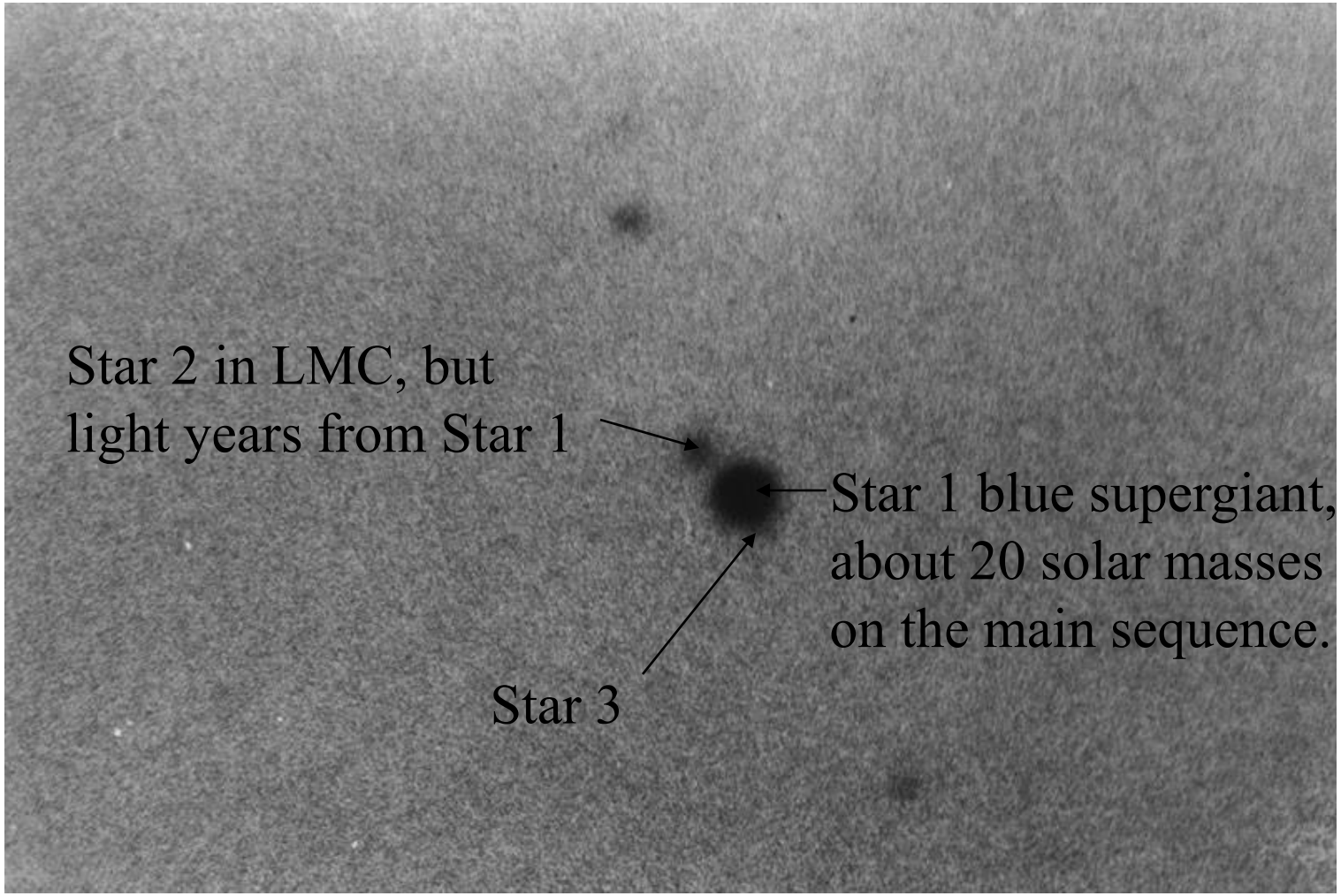


Photo of progenitor star (giraffe): Courtesy Yu Hua Chu



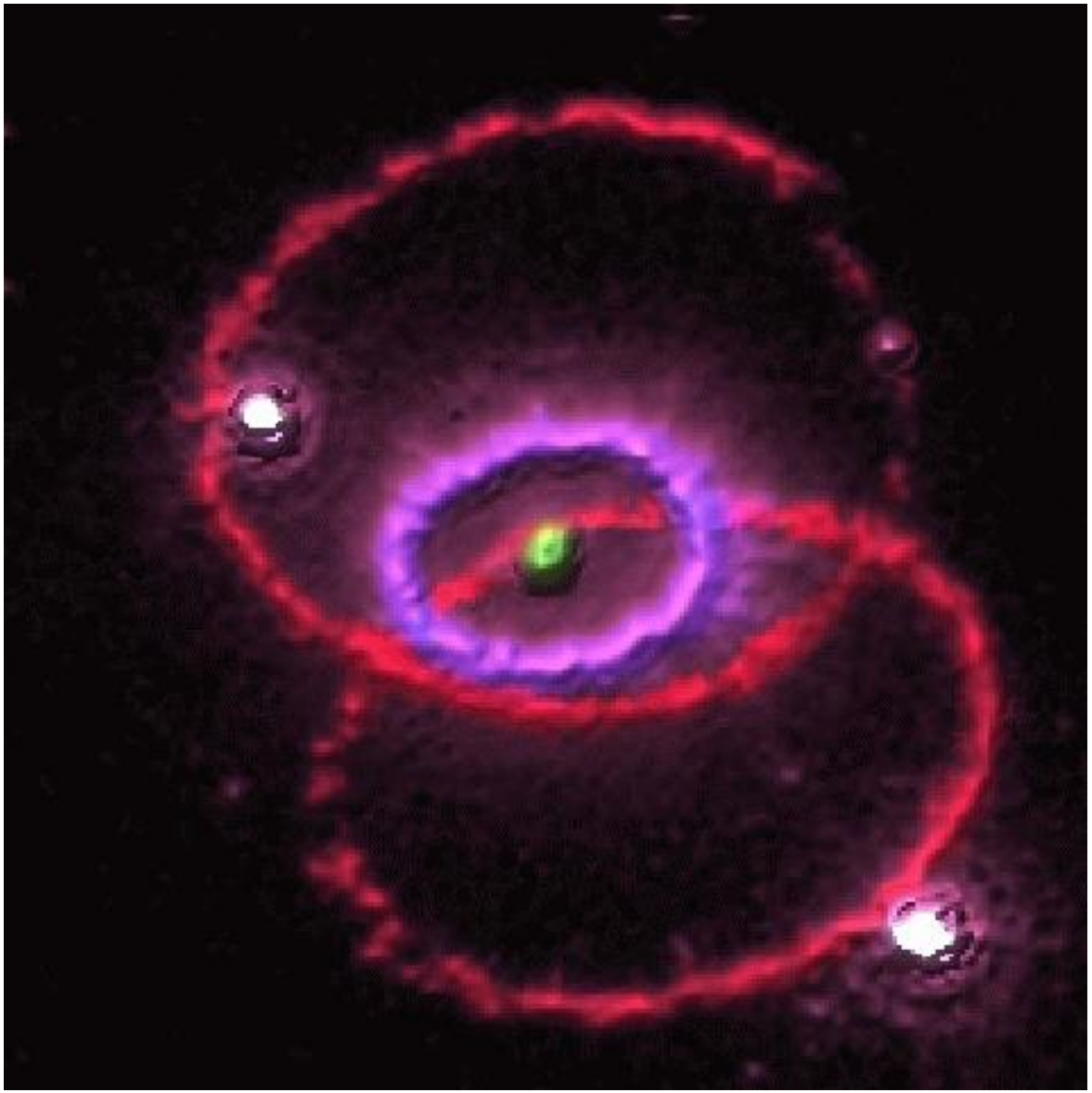
Stars 1, 2, 3: Courtesy Yu Hua Chu

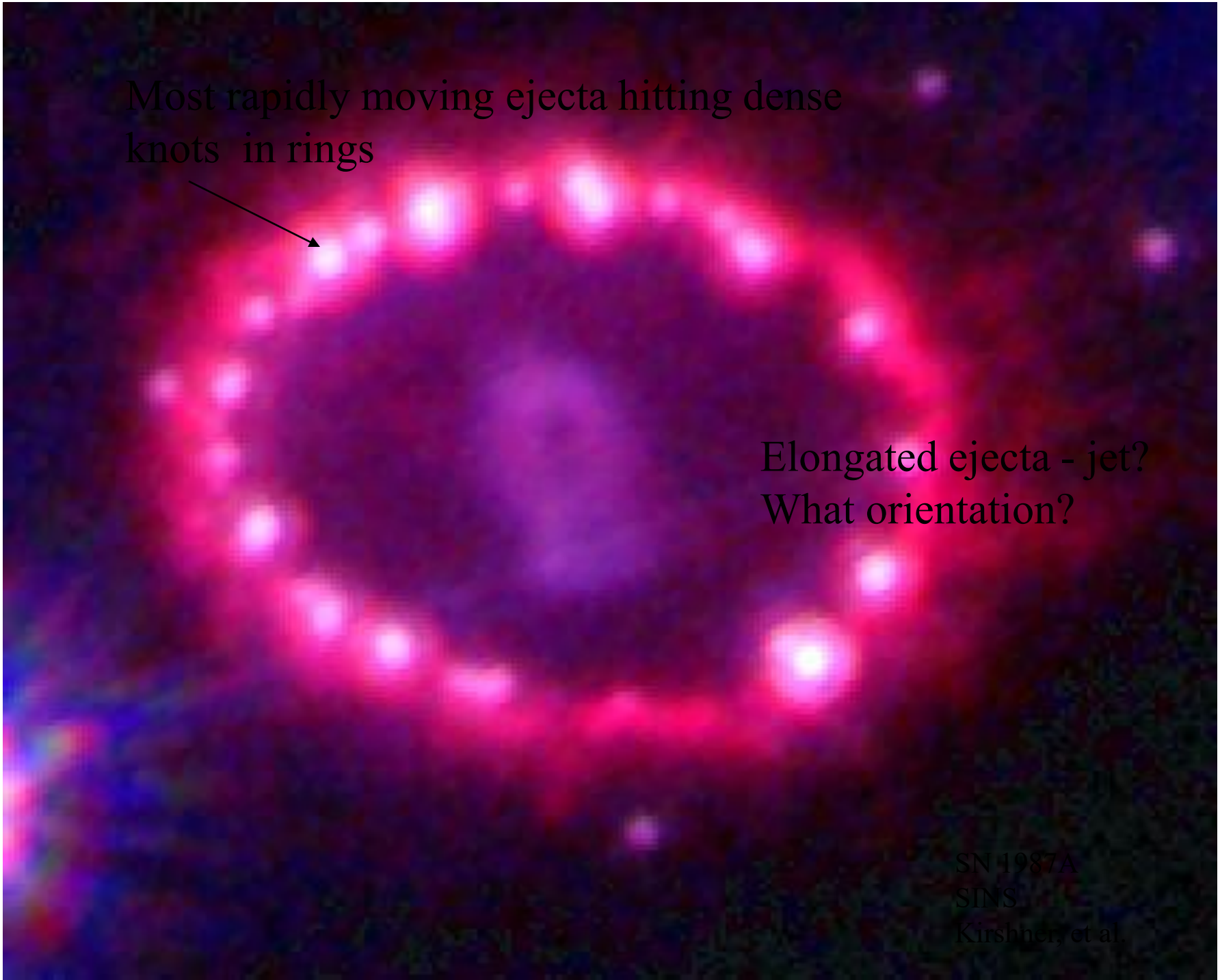


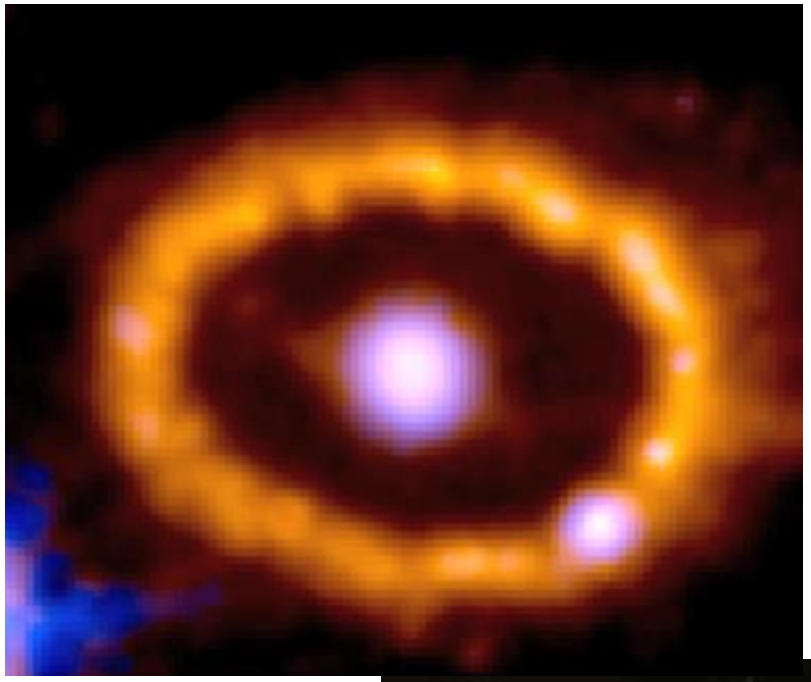
Close-up


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

The triple rings - ejected from the star 10,000 years before the explosion. Maybe a merger in a binary system?

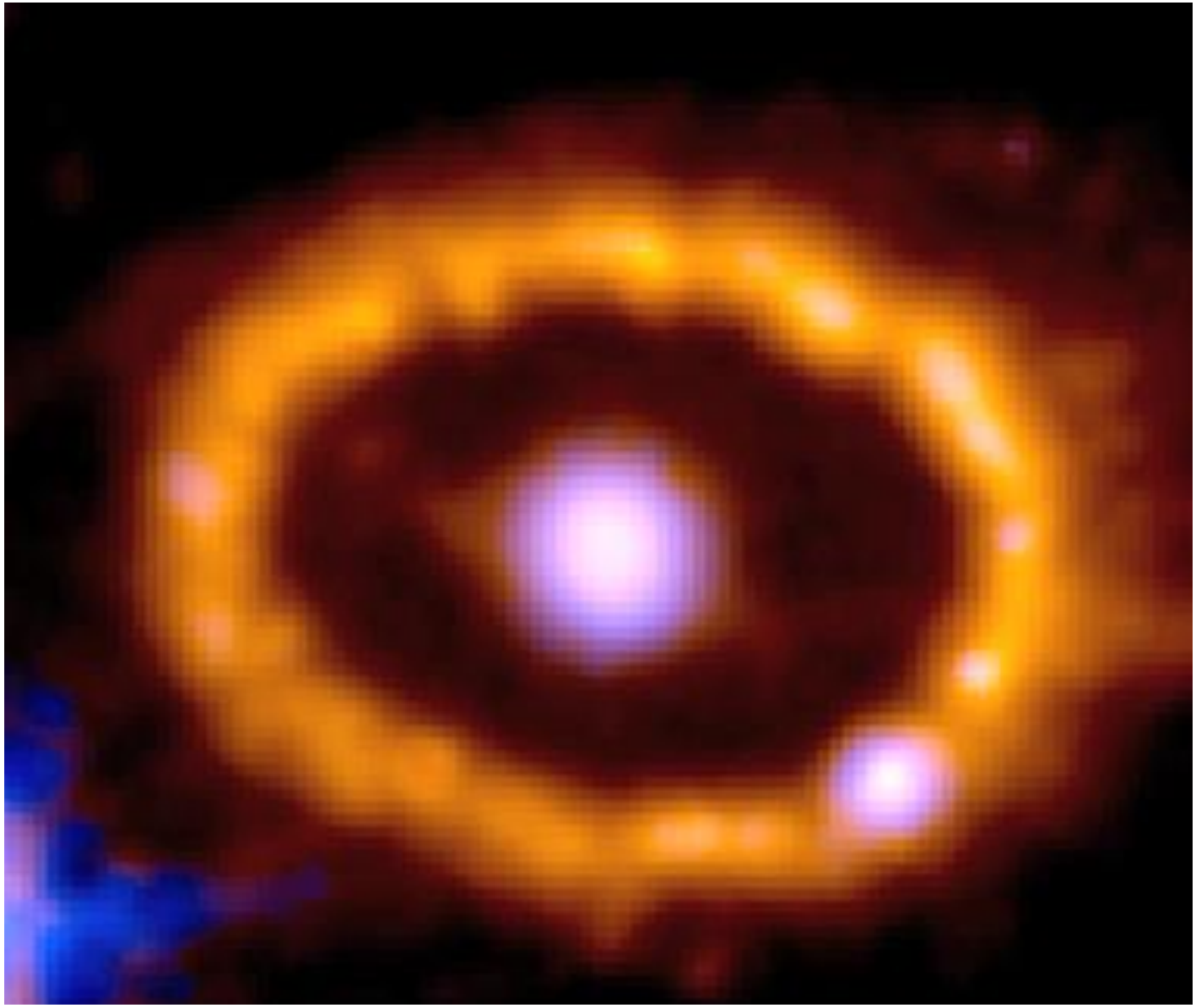



Most rapidly moving ejecta hitting dense knots in rings
Elongated ejecta - jet? What orientation?
SN 1987A
SINS
Kirshner et al.

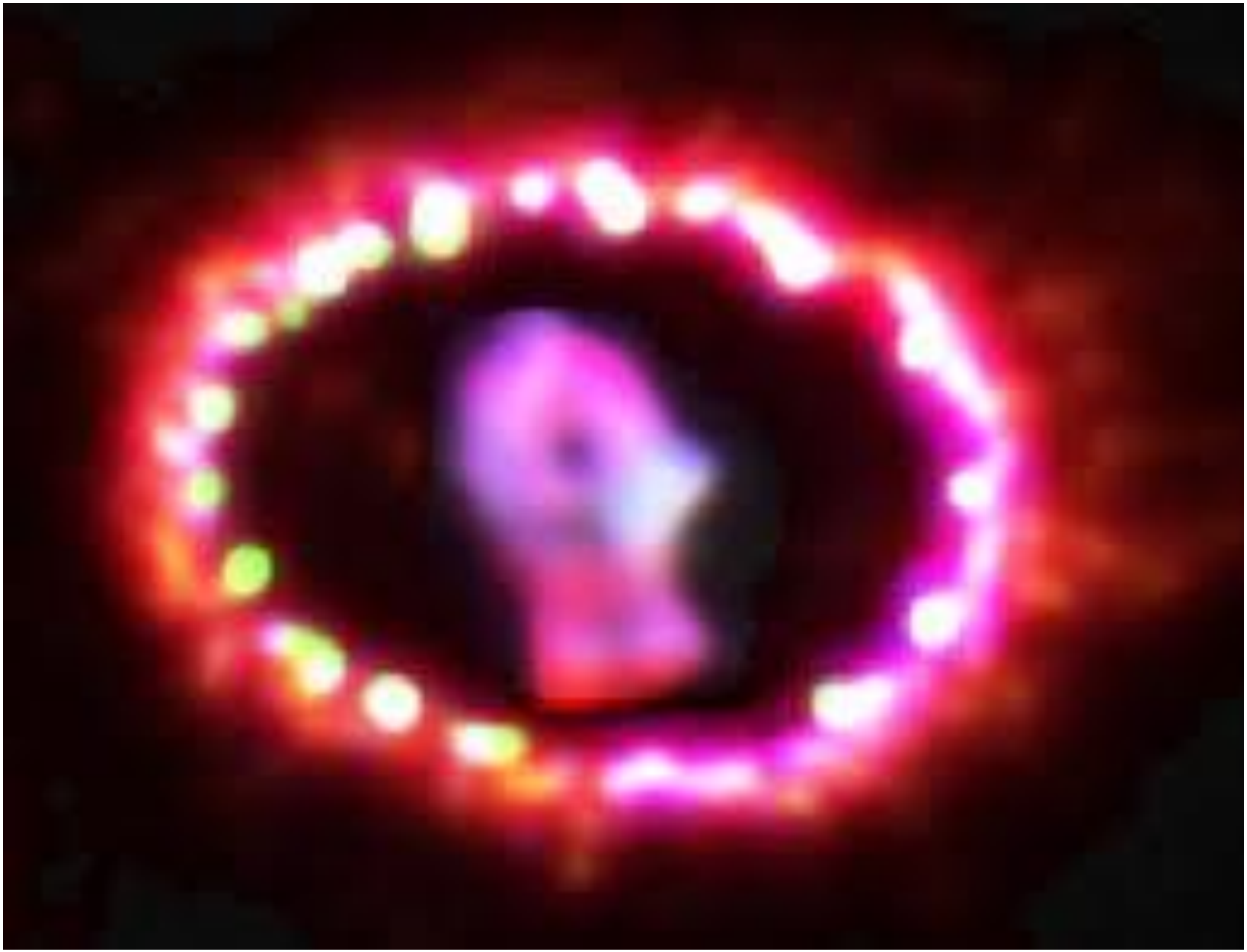



Optical

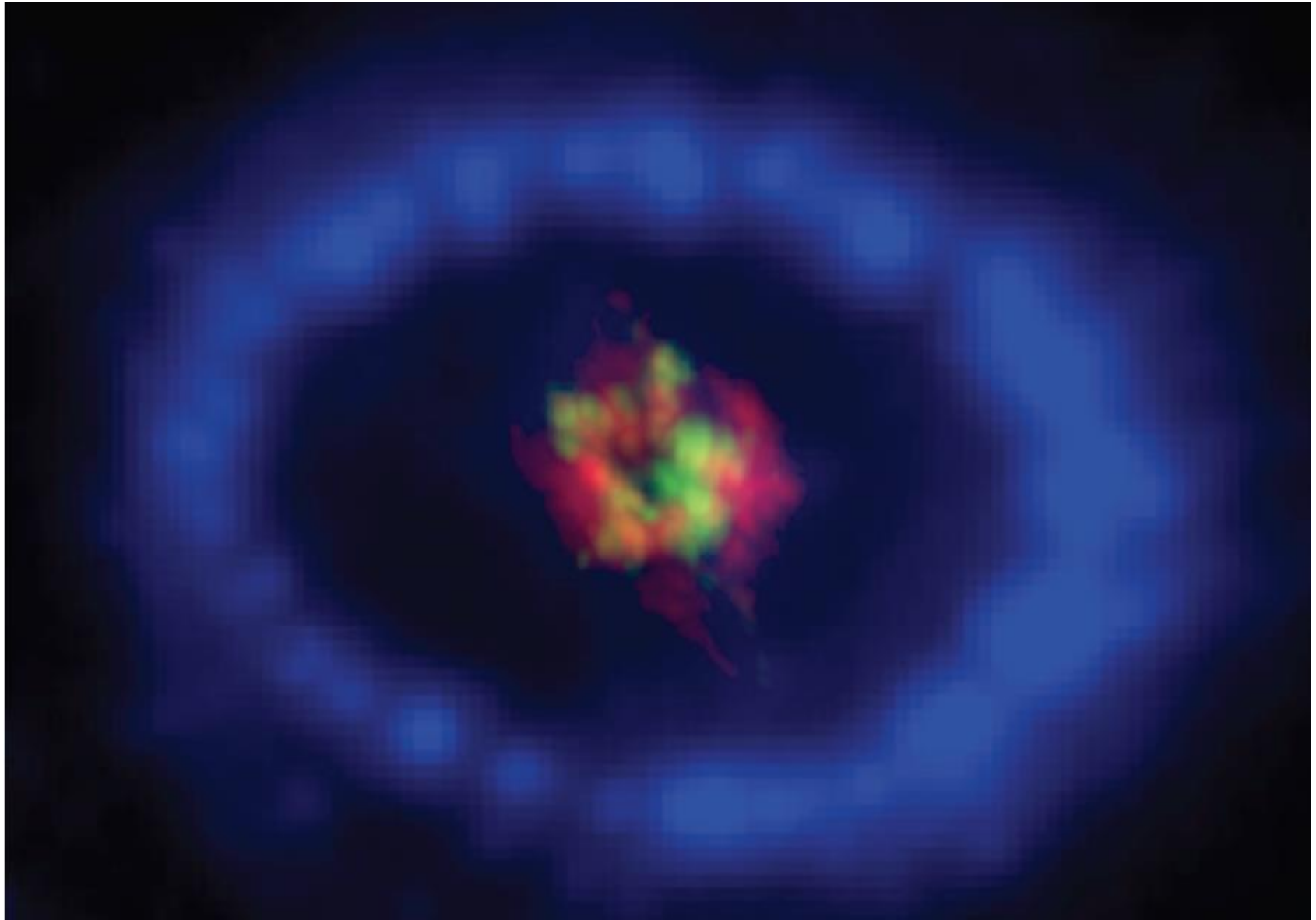
Updated to 2010

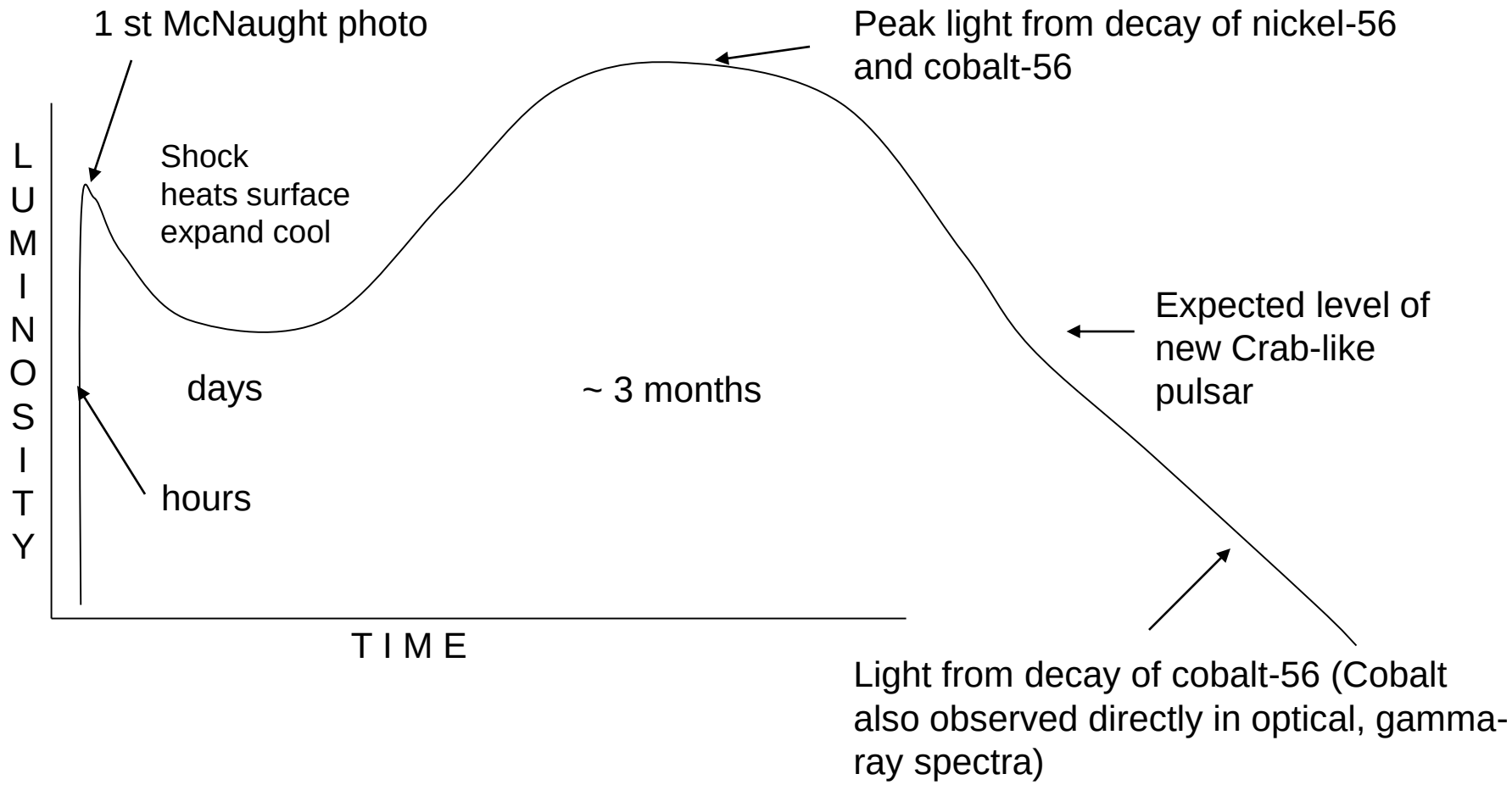


Recent Hubble Image of SN 1987A



Recent observation with submillimeter telescope in Chile – ALMA.
Molecules! Carbon dioxide (red, CO_2) and silicon oxide, (green, SiO)





SN 1987A had a rather peculiar light curve because it was a relatively compact blue supergiant, not a red supergiant (not sure why, maybe in binary system), brief shock heating, rapid cooling by expansion, no plateau, subsequent light all from radioactive decay.