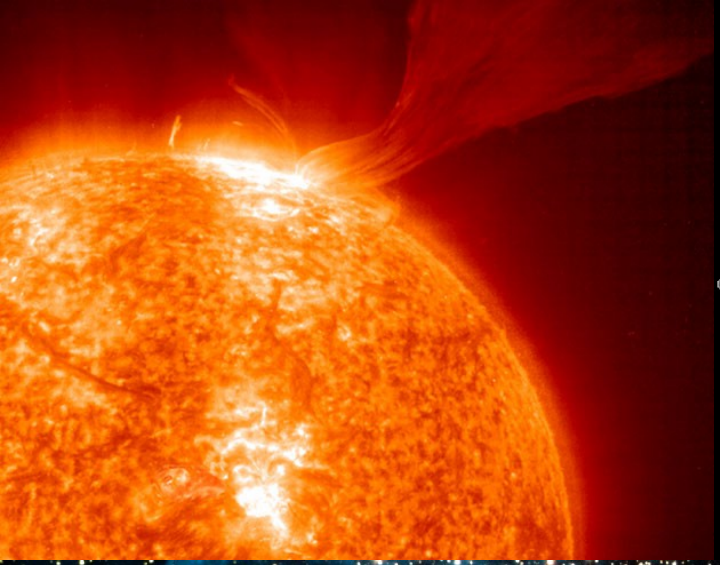
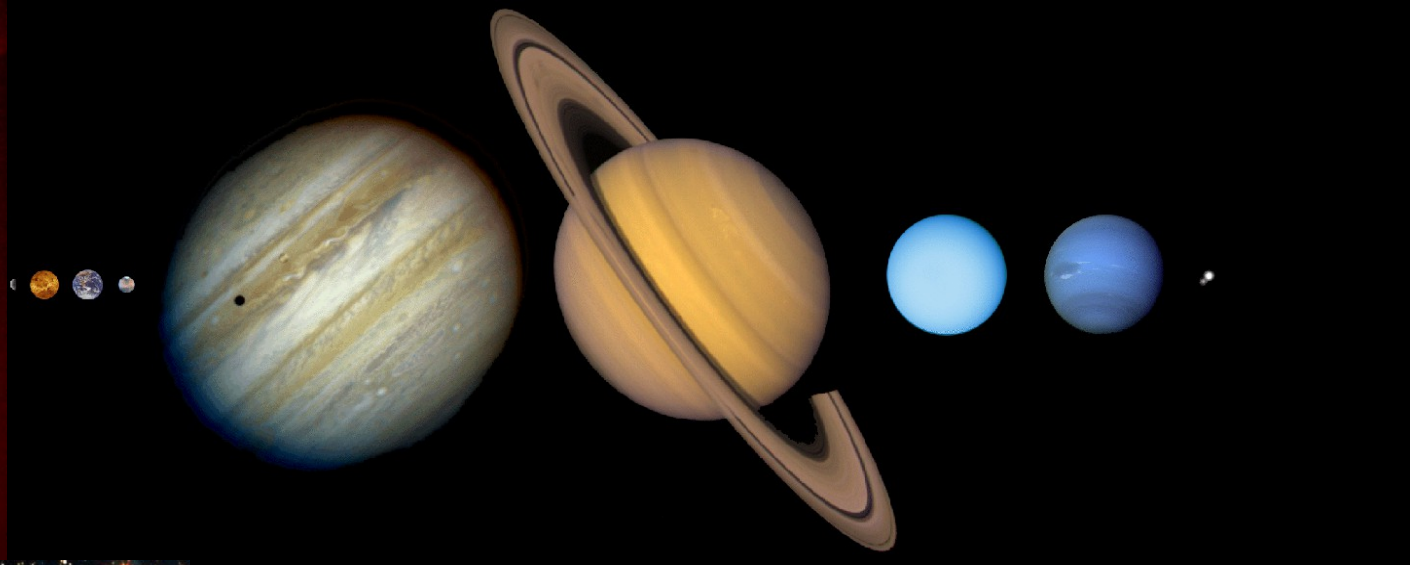
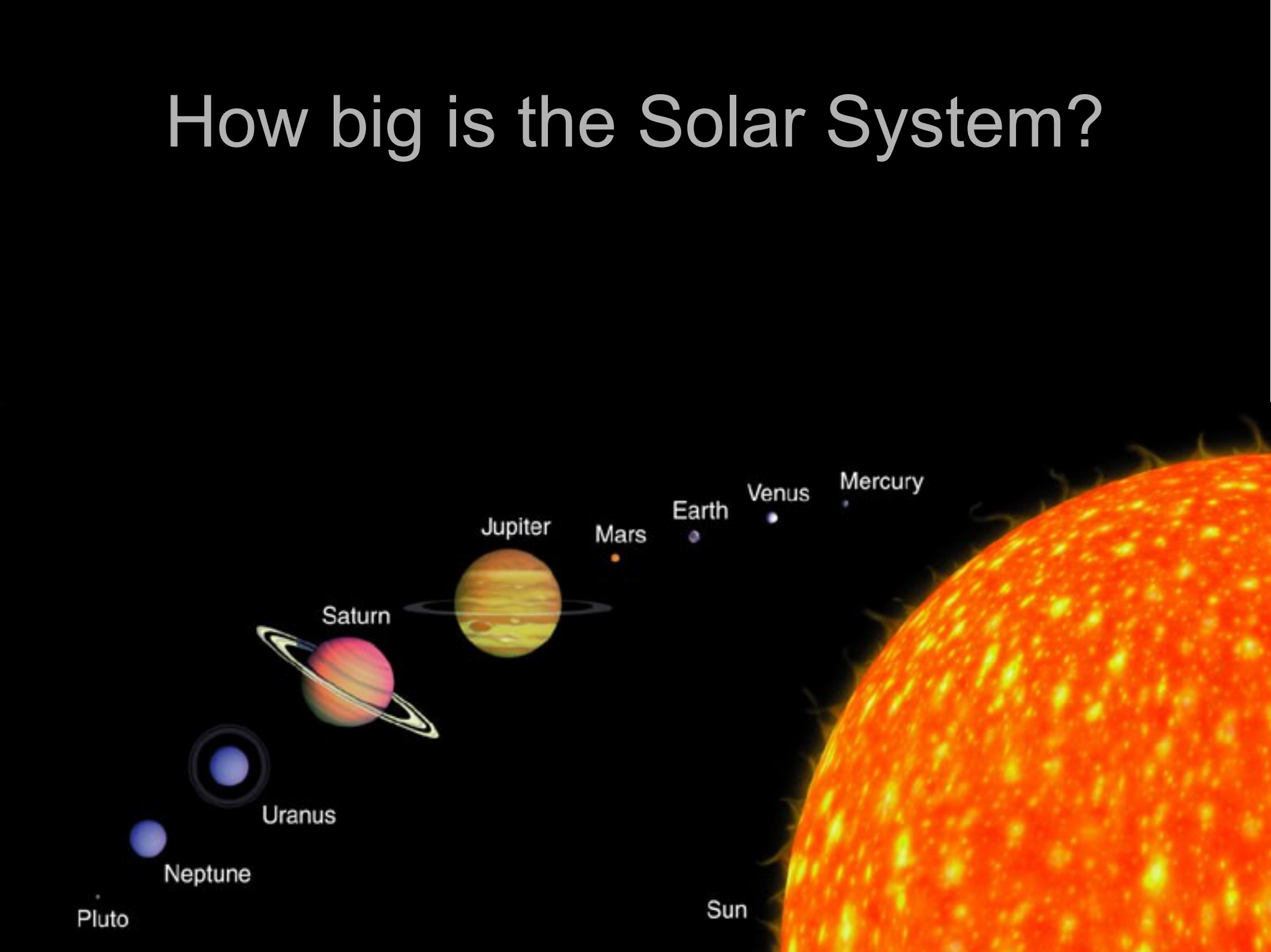




# Astronomy

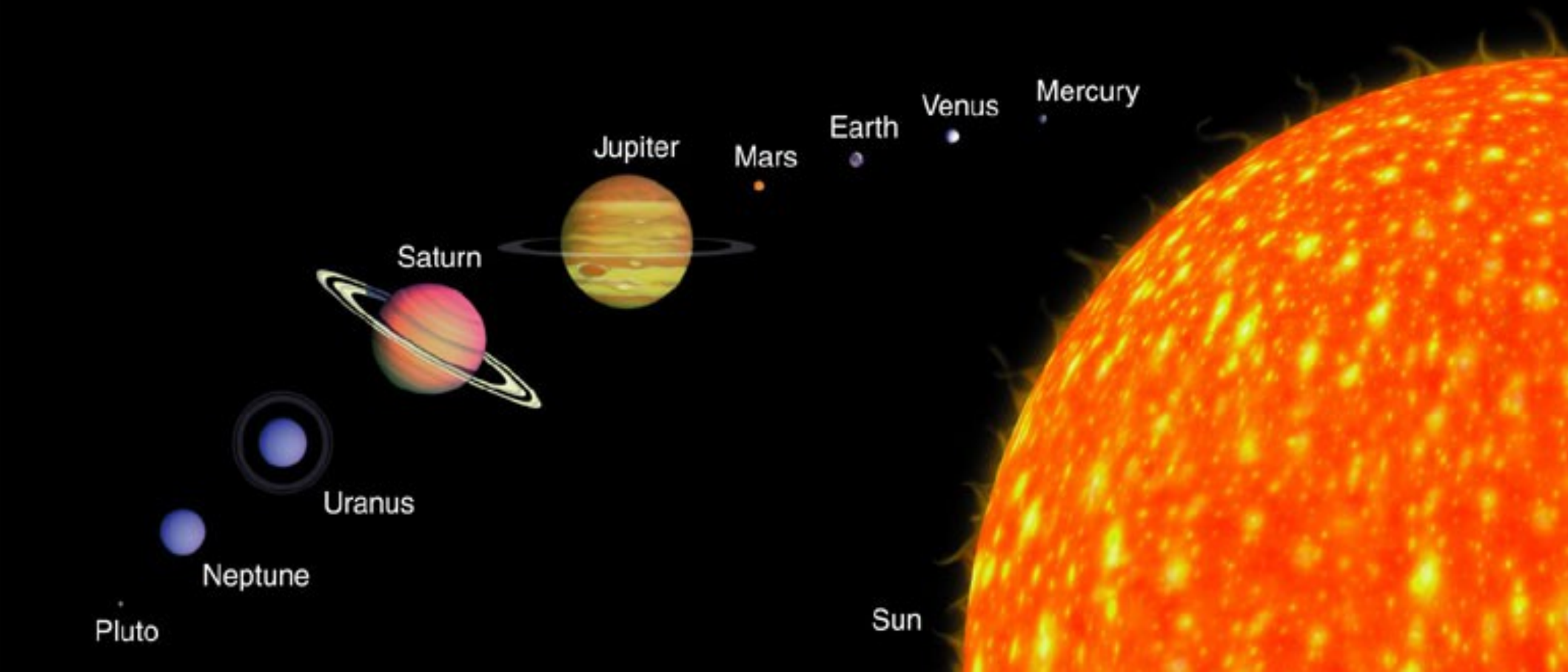
# How big is the Solar System?



# If Sun were a grape fruit (10 cm):

| | | |
|---|---|---|
| Earth, a grain of sand | 1mm, | 15 m away |
| Jupiter, a marble | 1.5cm, | 80 m away |
| Pluto, a tiny grain of sand | 0.2mm, | 700 m away |

And the NEXT CLOSEST sun (or star) would be in ...



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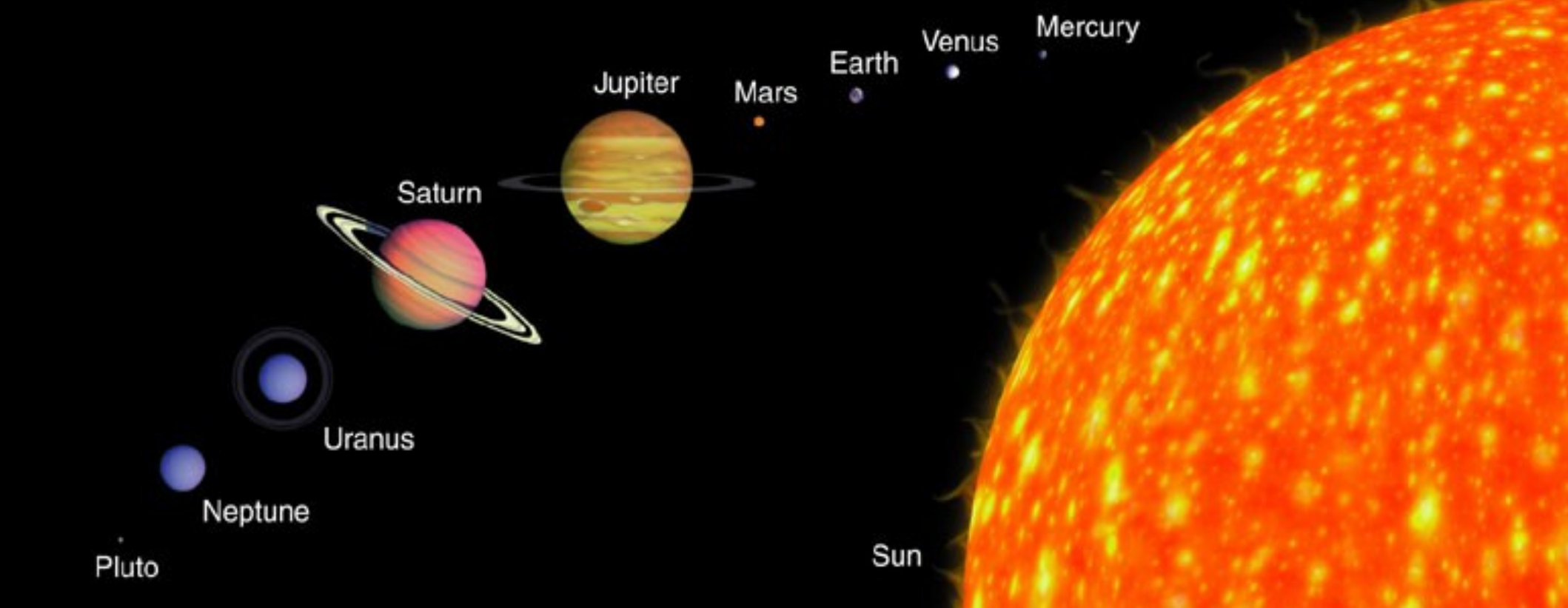
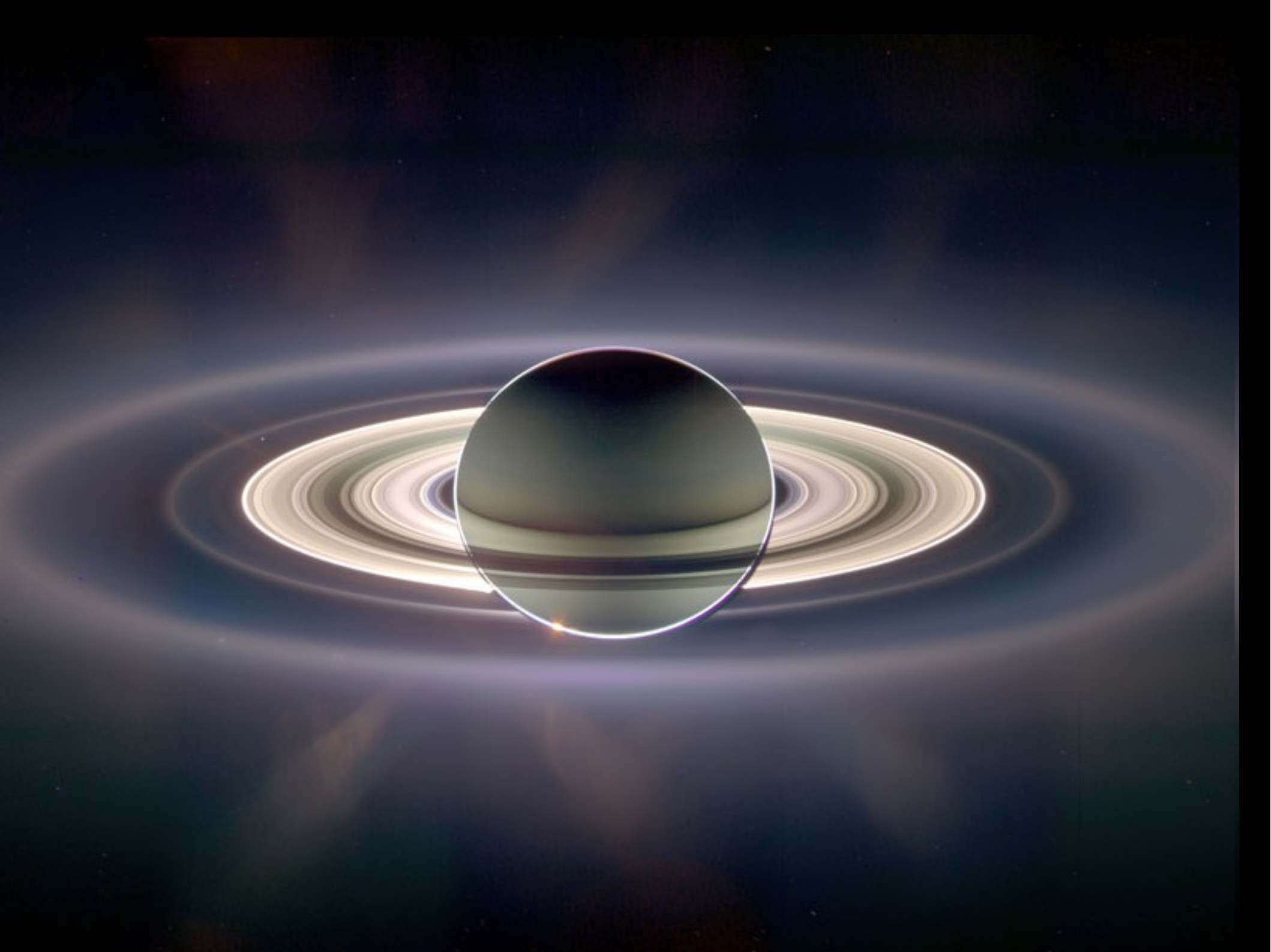
| Pluto, a tiny grain of sand | 0.2mm, | 700 m away |

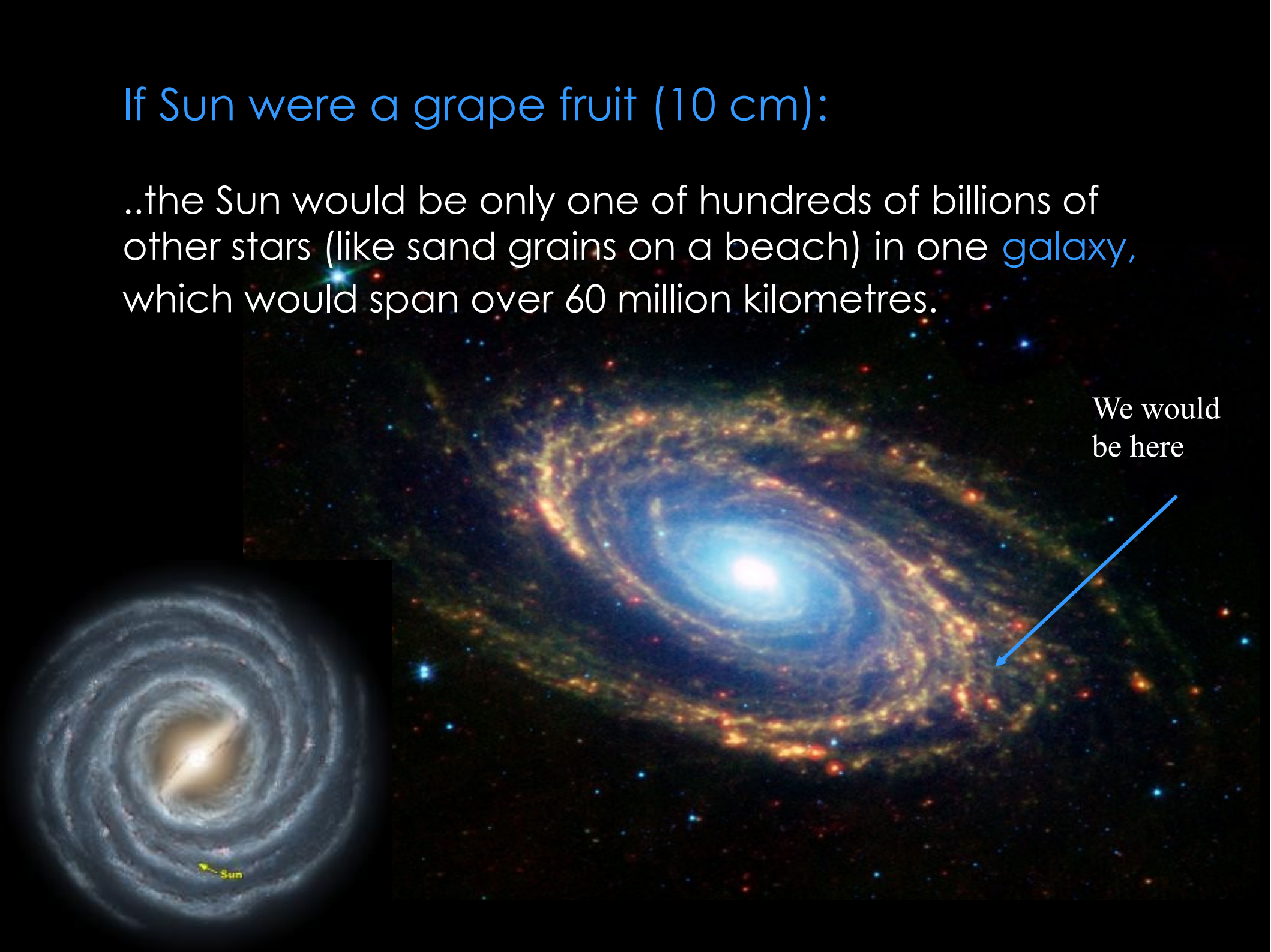
And the NEXT CLOSEST sun (or star) would be in ...
Nairobi!

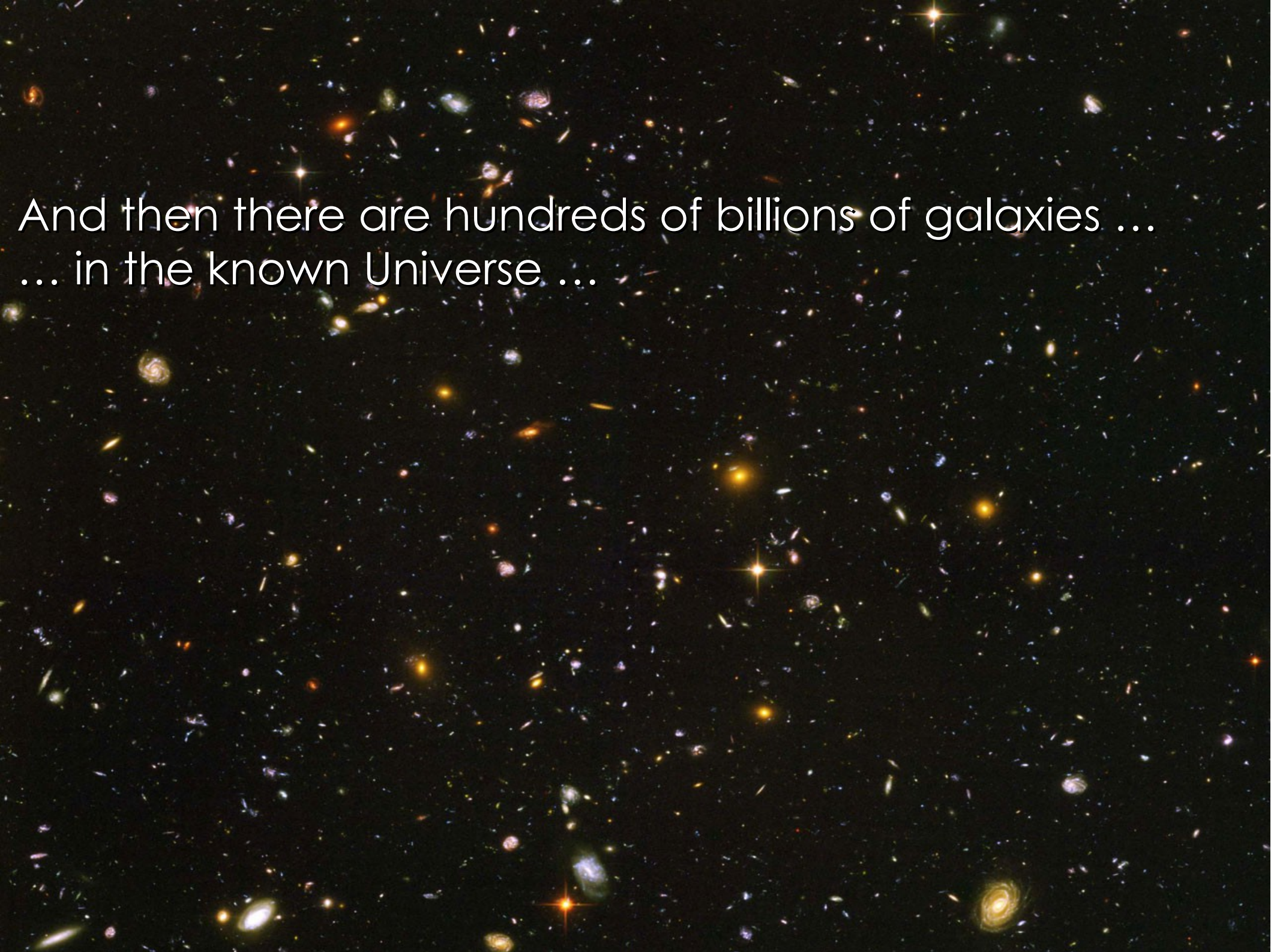




# If Sun were a grape fruit (10 cm):

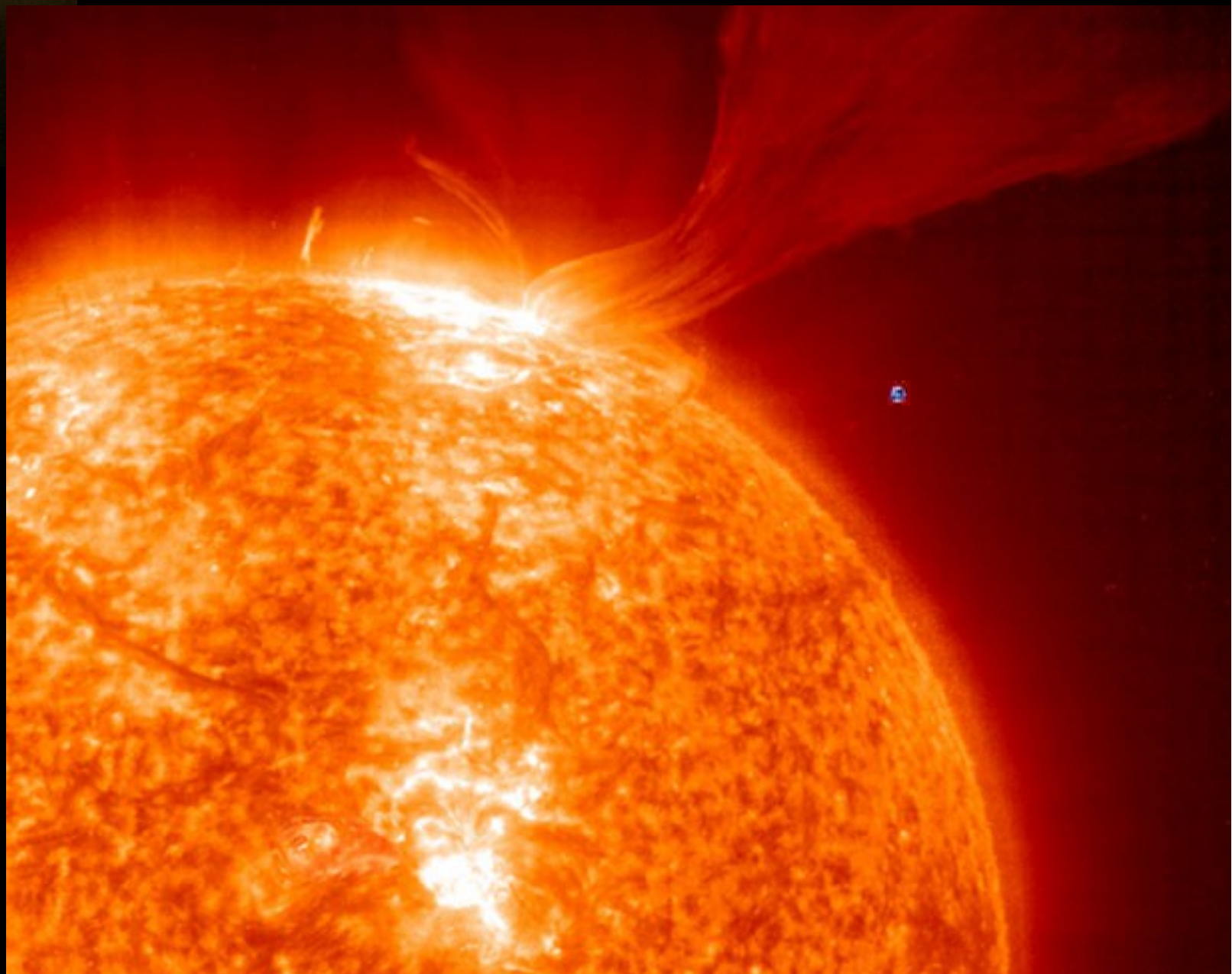
..the Sun would be only one of hundreds of billions of other stars (like sand grains on a beach) in one galaxy, which would span over 60 million kilometres.

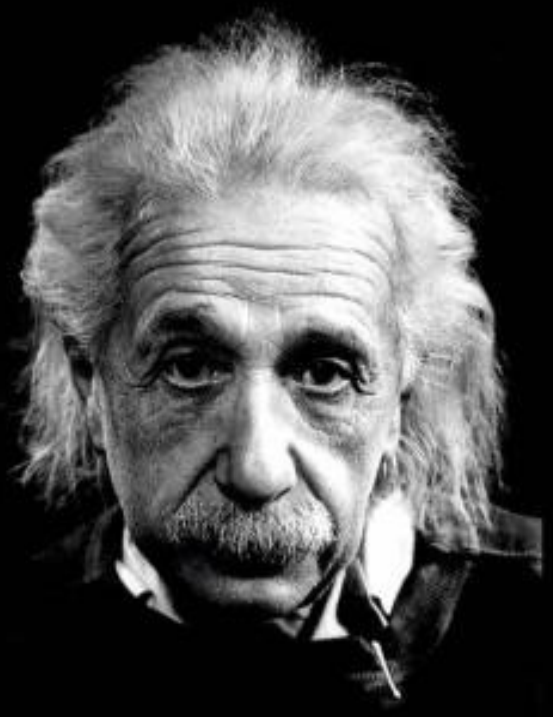



And then there are hundreds of billions of galaxies …
… in the known Universe …

# THE NEAREST STAR:

# OUR LOCAL NUCLEAR FURNACE

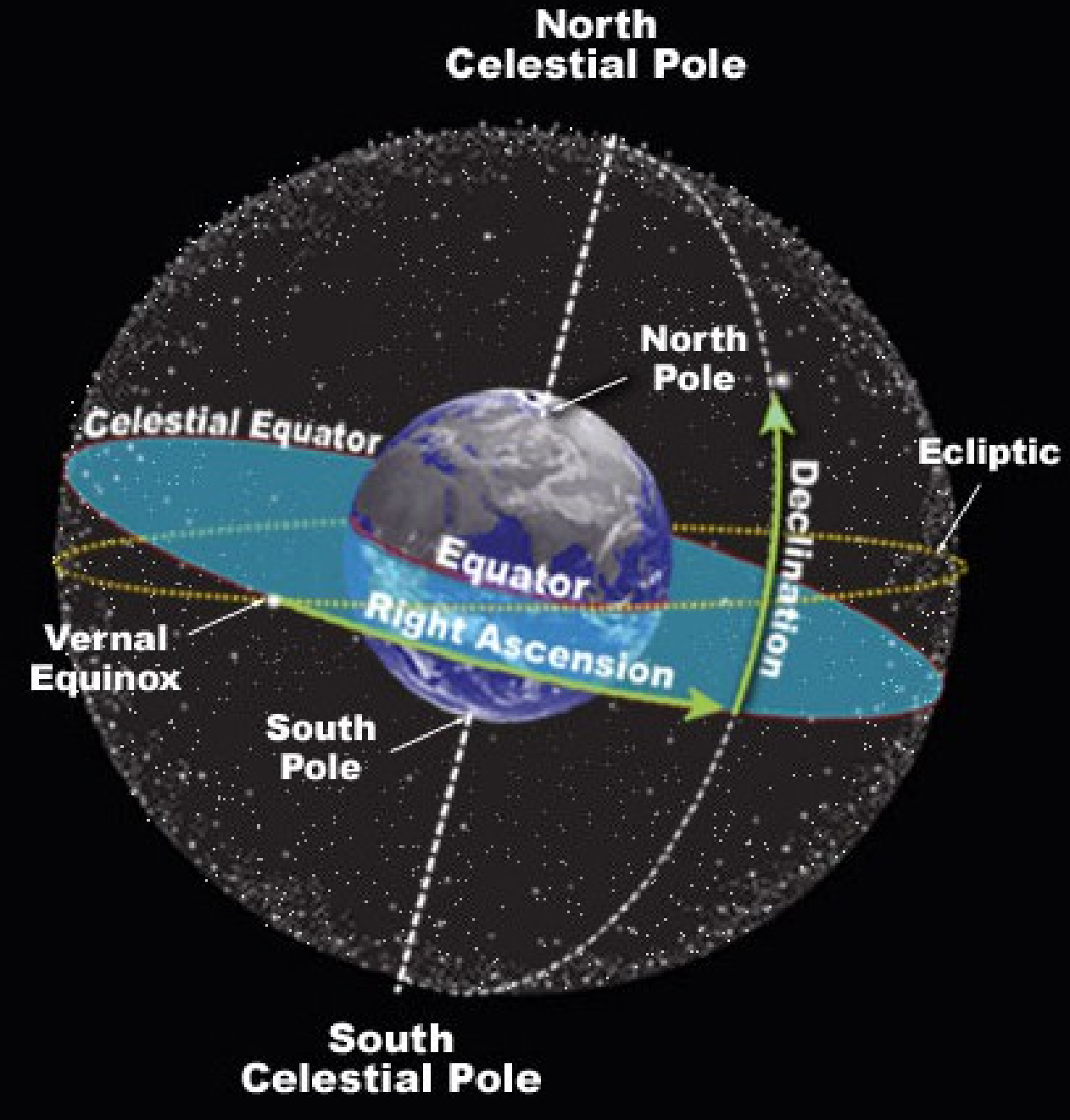




$$E = m c^2$$

The sun loses 4.3 million tons of its mass every second.

# Right Ascension and Declination




RA and DEC form the universal coordinate systems used in astronomy

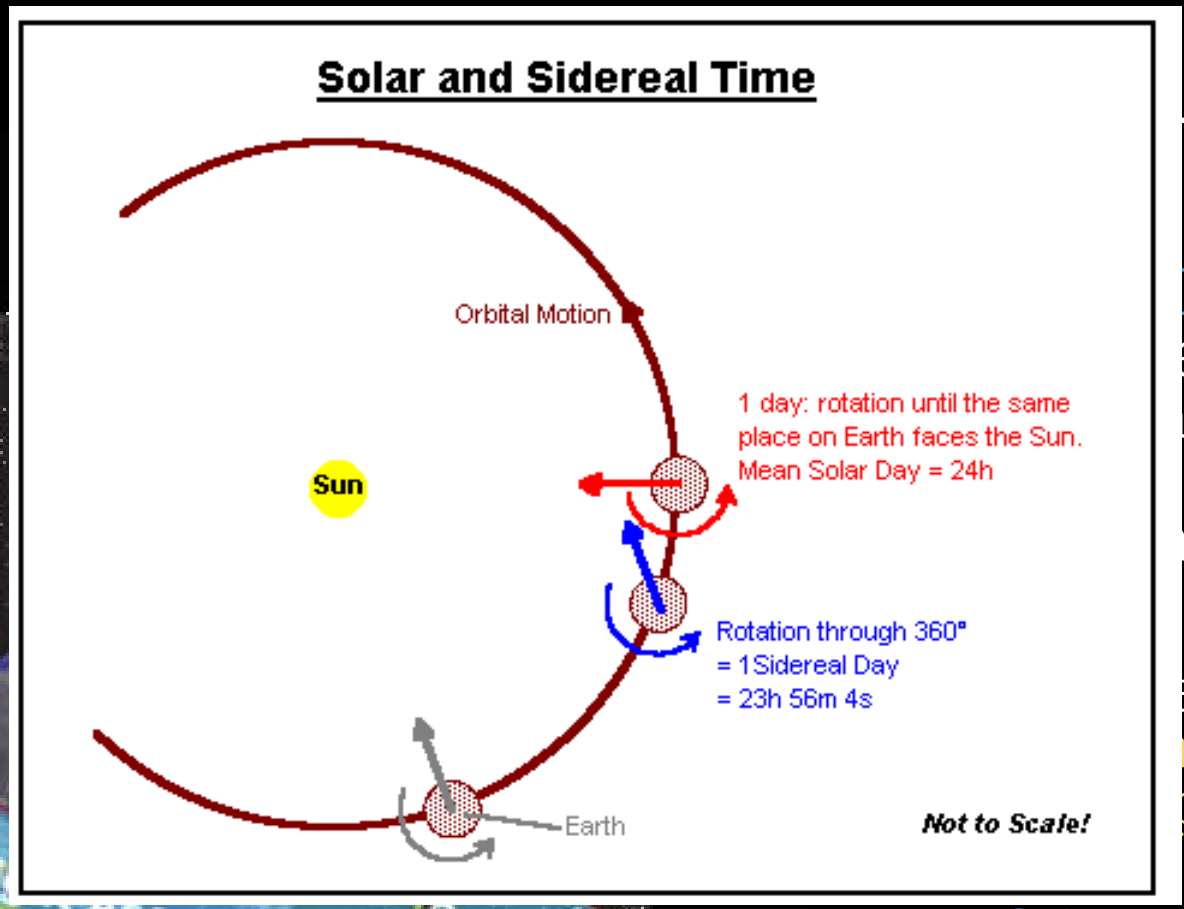
RA is measured East of the Vernal Equinox point in HOURS

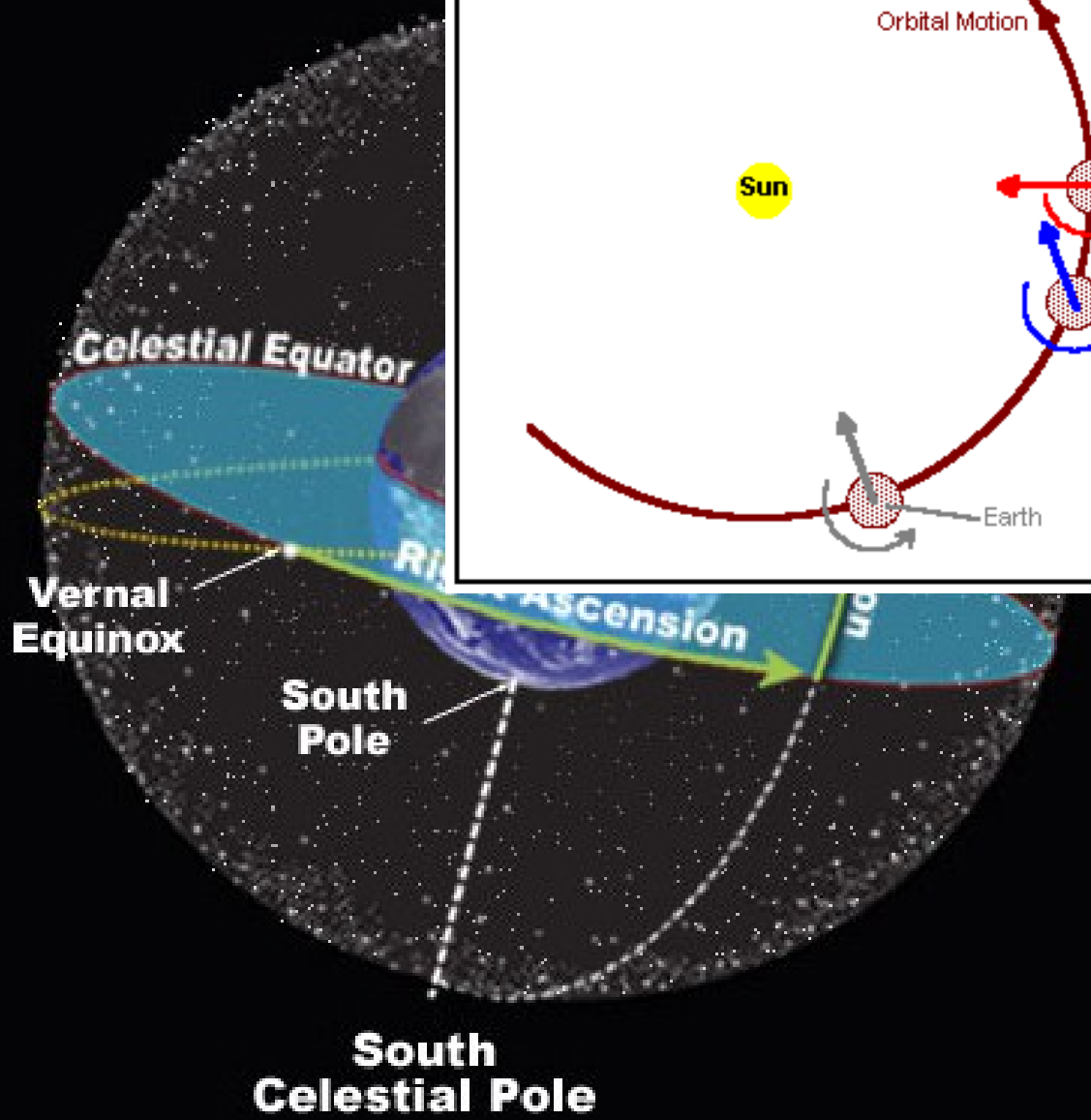
DEC is measured North of the Celestial Equator in DEGREES.

e.g. Sirius is at

- RA = 6h 45m 28s
- DEC = -16° 43’ 36”

# Right ...ation




...DEC form ...ersal ...te ...used in ...ny

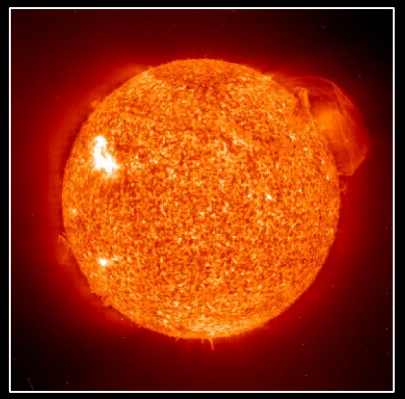
...asured ...e Vernal ...point in

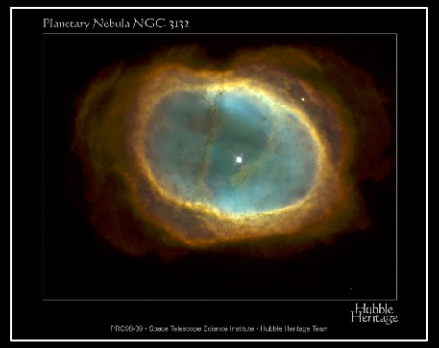
DEC is measured North of the Celestial Equator in DEGREES.

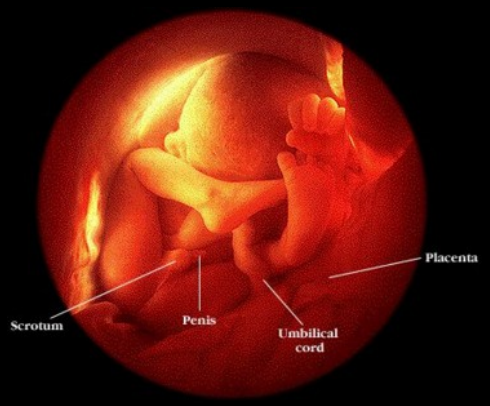
e.g. Sirius is at

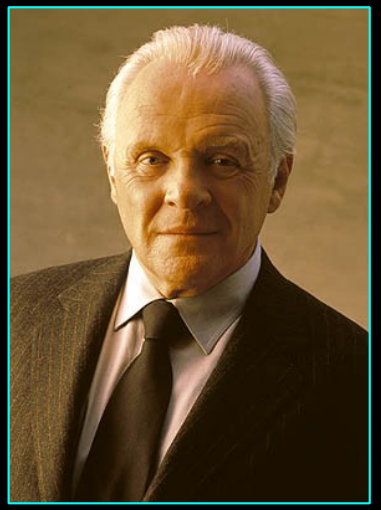
- RA = 6h 45m 28s
- DEC = -16° 43’ 36”

# Stars are born, they live, and grow old

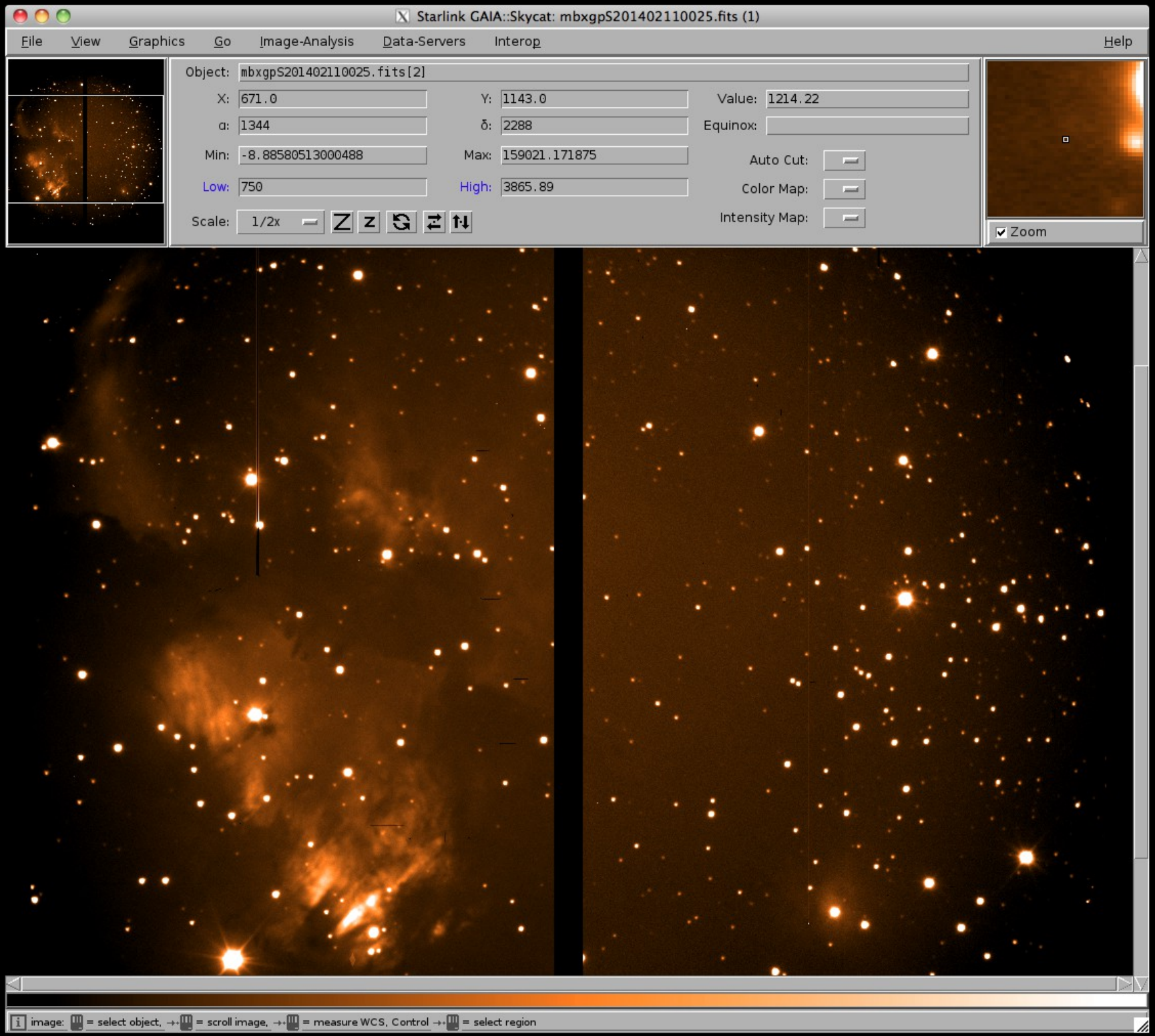




STARBIRTH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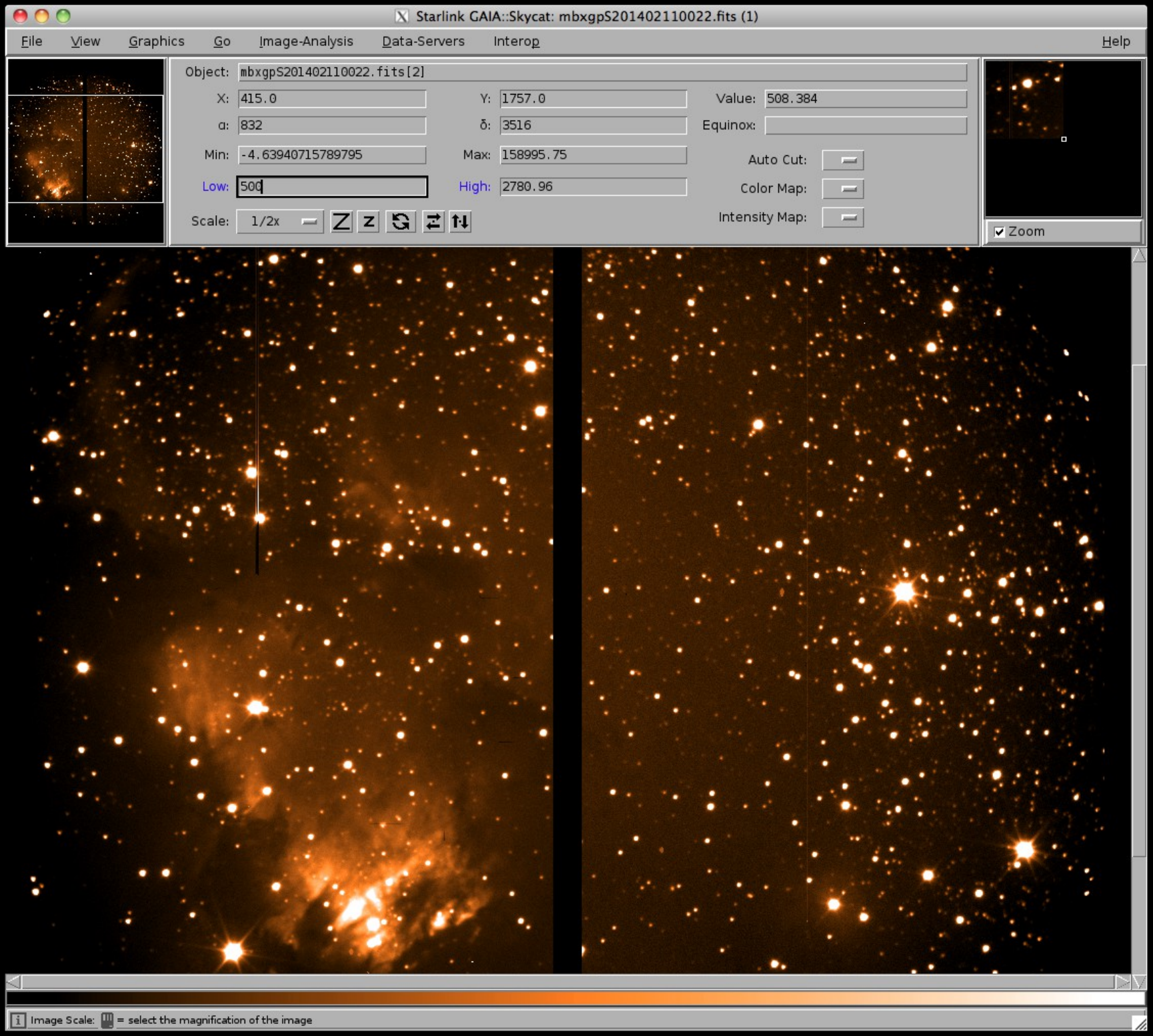
Scale: 1/2x
Intensity Map:
Zoom
image: = select object, = scroll image, = measure WCS, Control = select region

NGC 3582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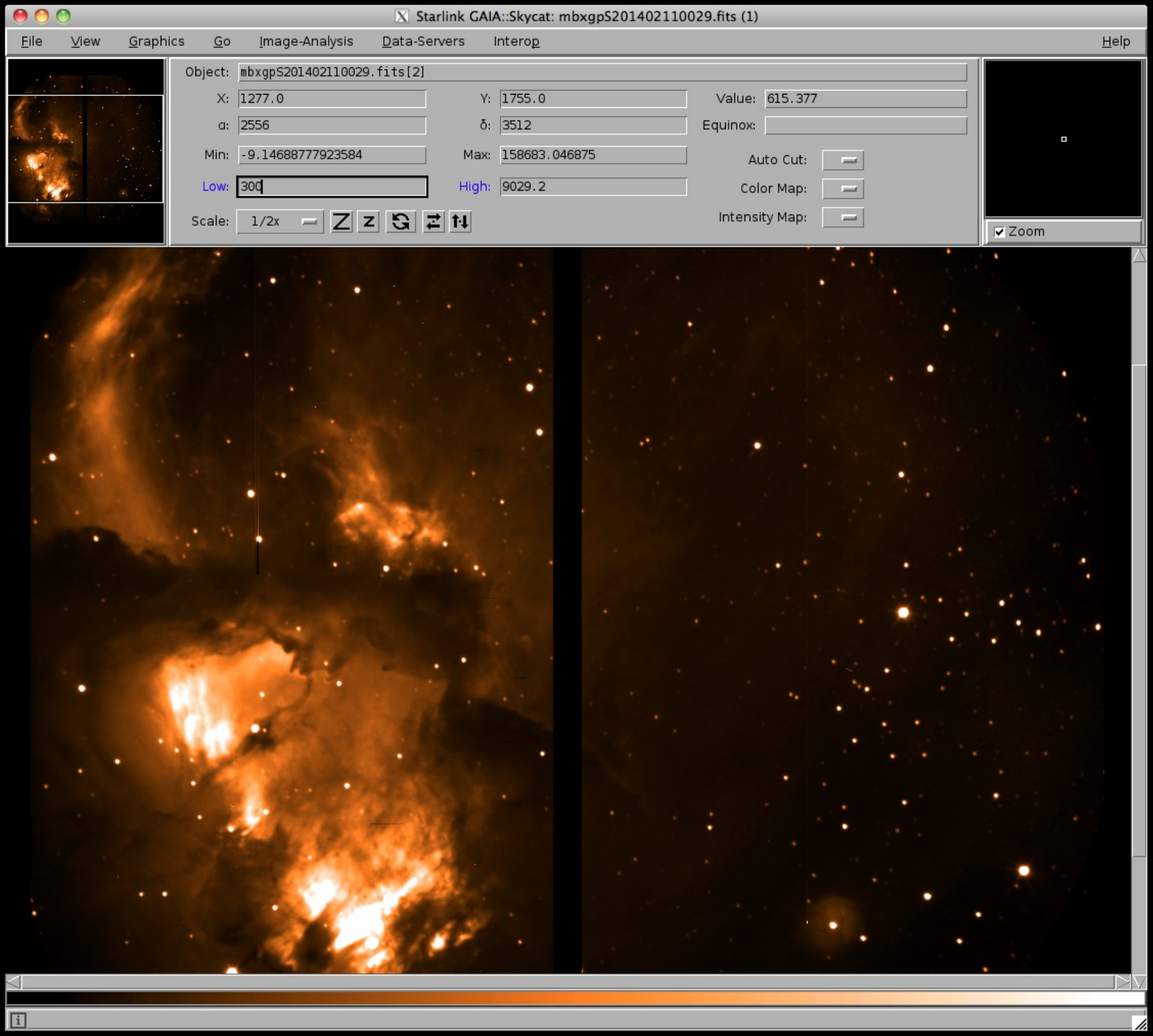
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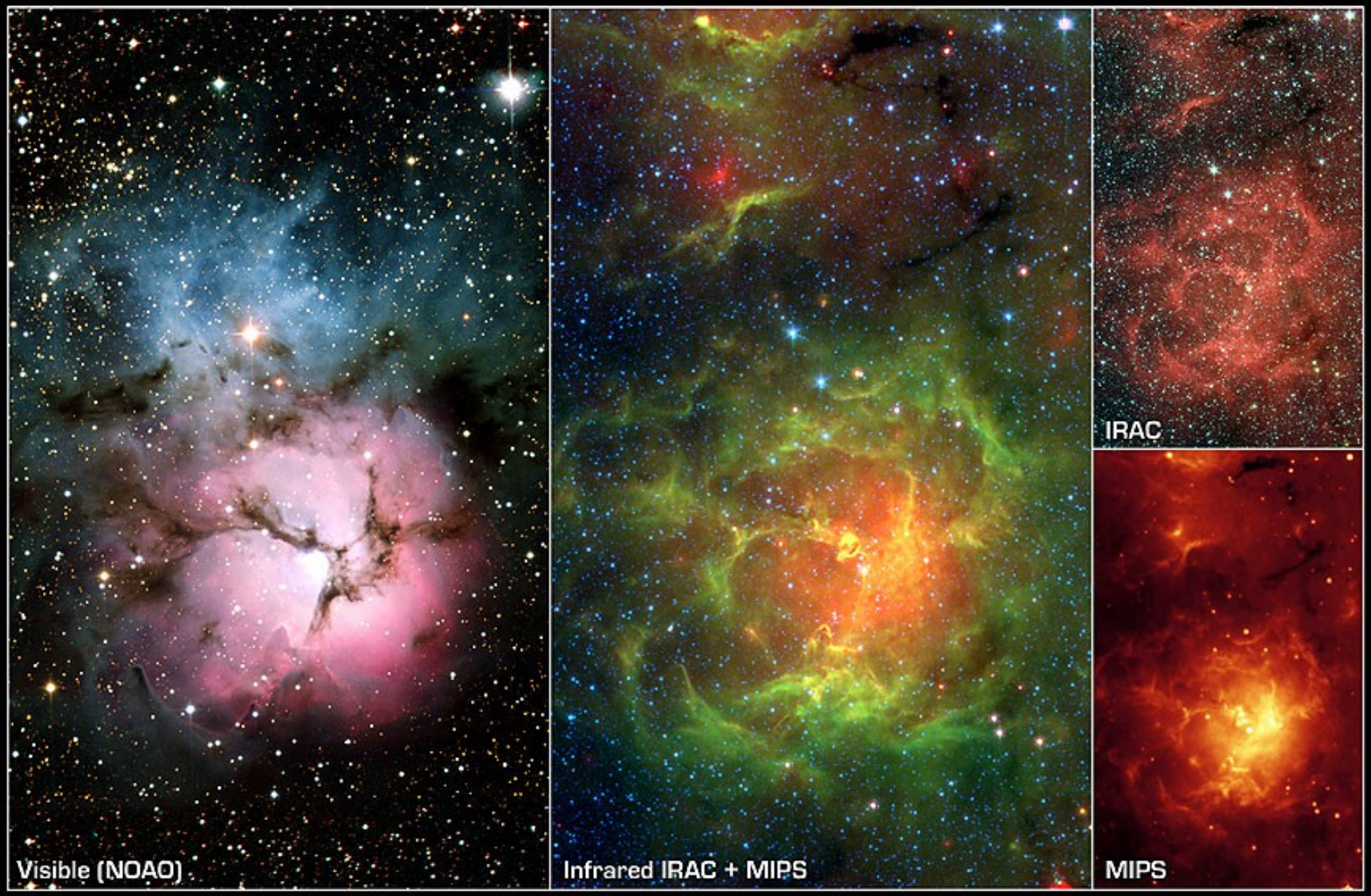


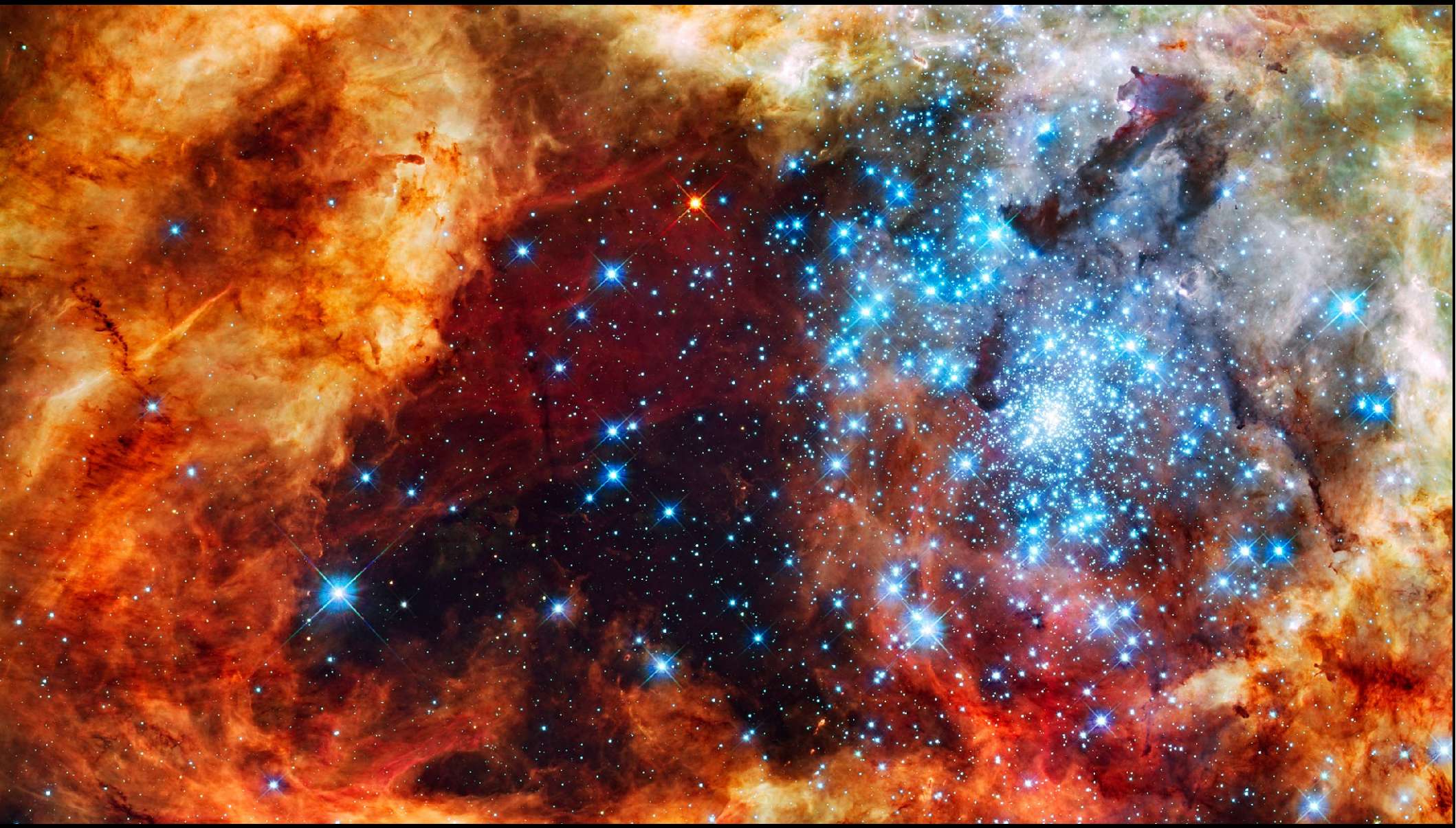

**Trifid Nebula/Messier 20**

NASA / JPL-Caltech / J. Rho (SSC/Caltech)

**Spitzer Space Telescope • IRAC + MIPS**

ssc2005-02a

YOUNG STARS



AND OLD
STARS

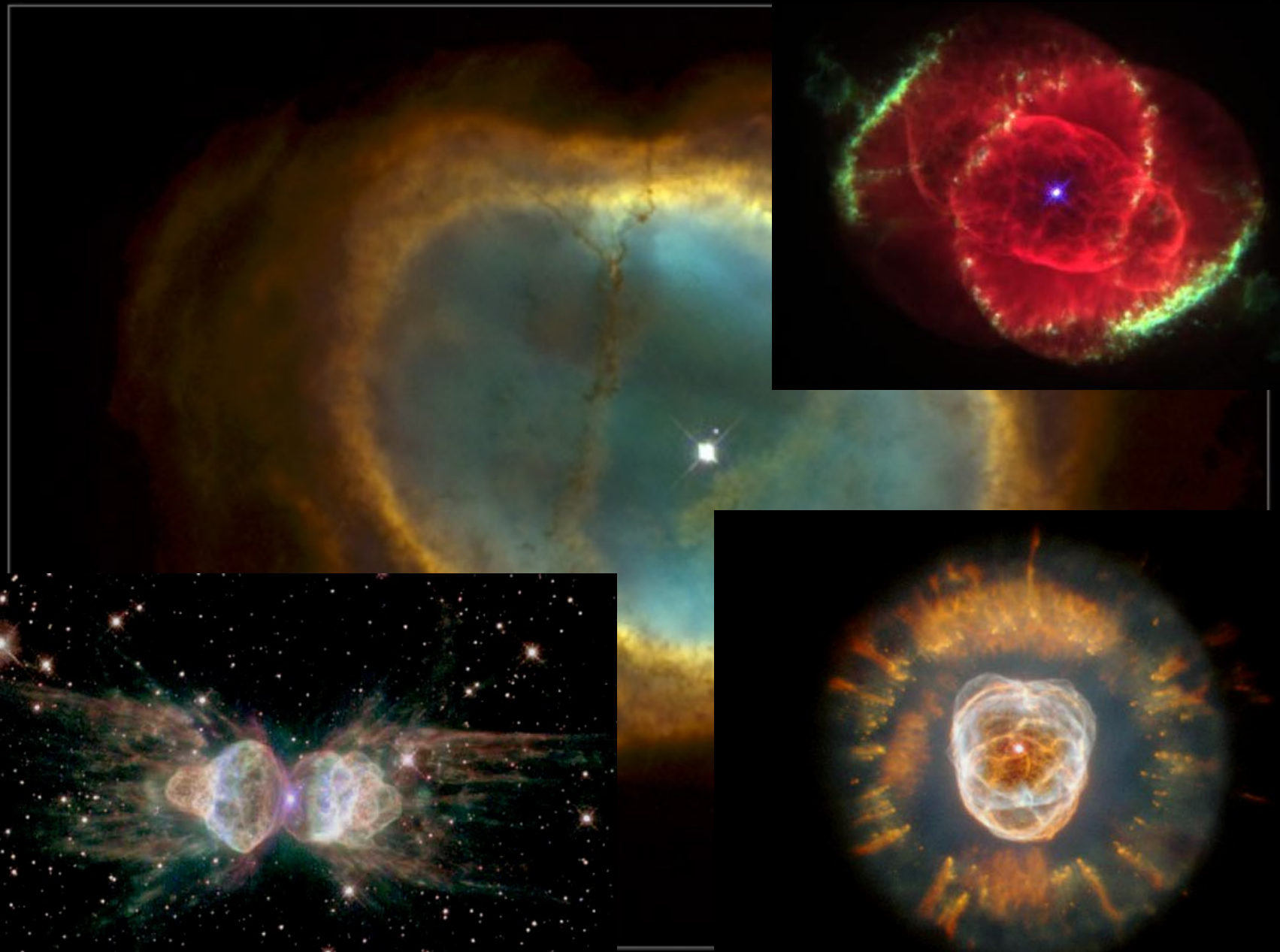
# DYING STARS

# Planetary Nebula NGC 3132

Hubble Heritage

PRC98-39 • Space Telescope Science Institute • Hubble Heritage Team

# Planetary Nebula NGC 3132



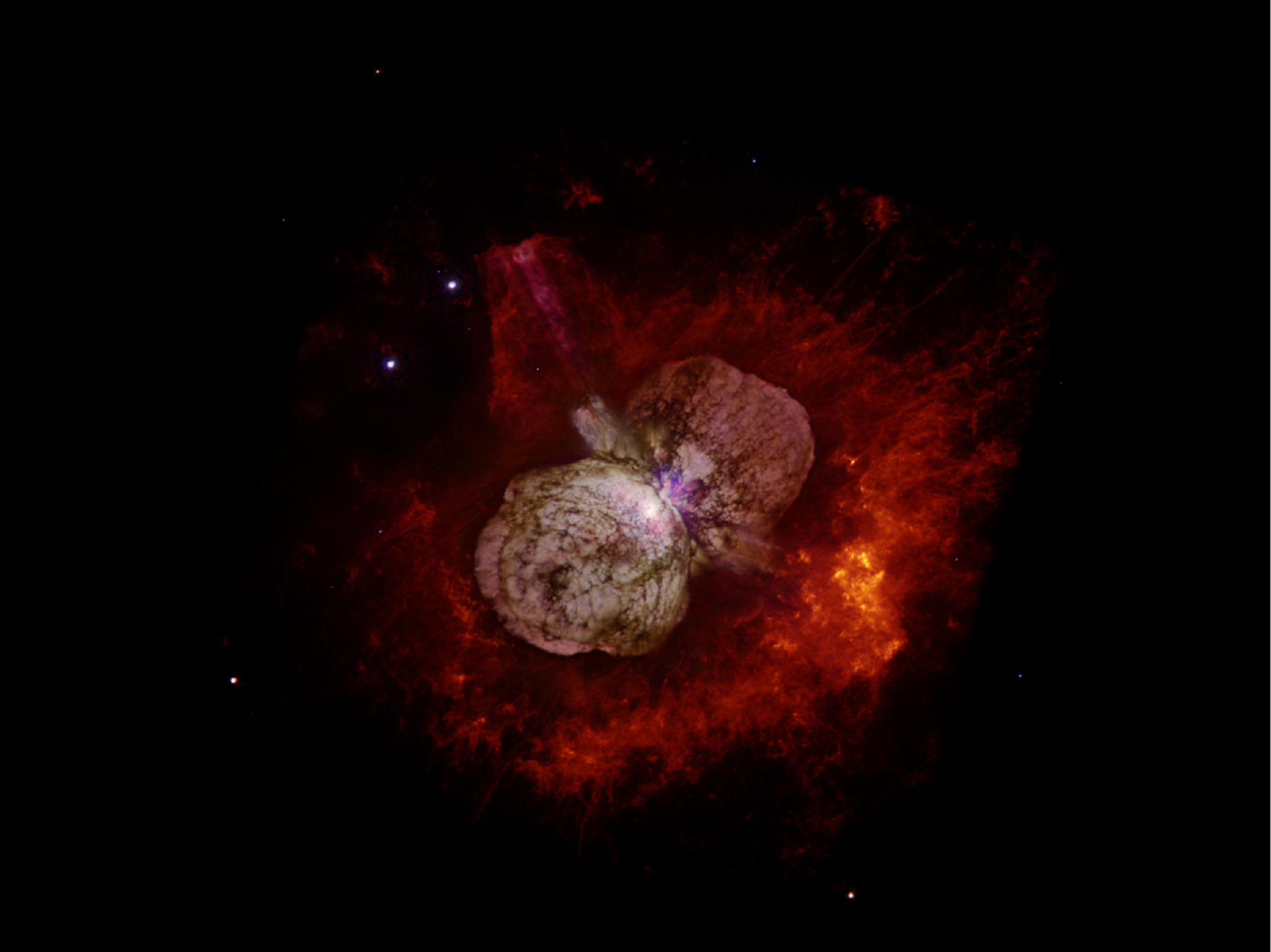




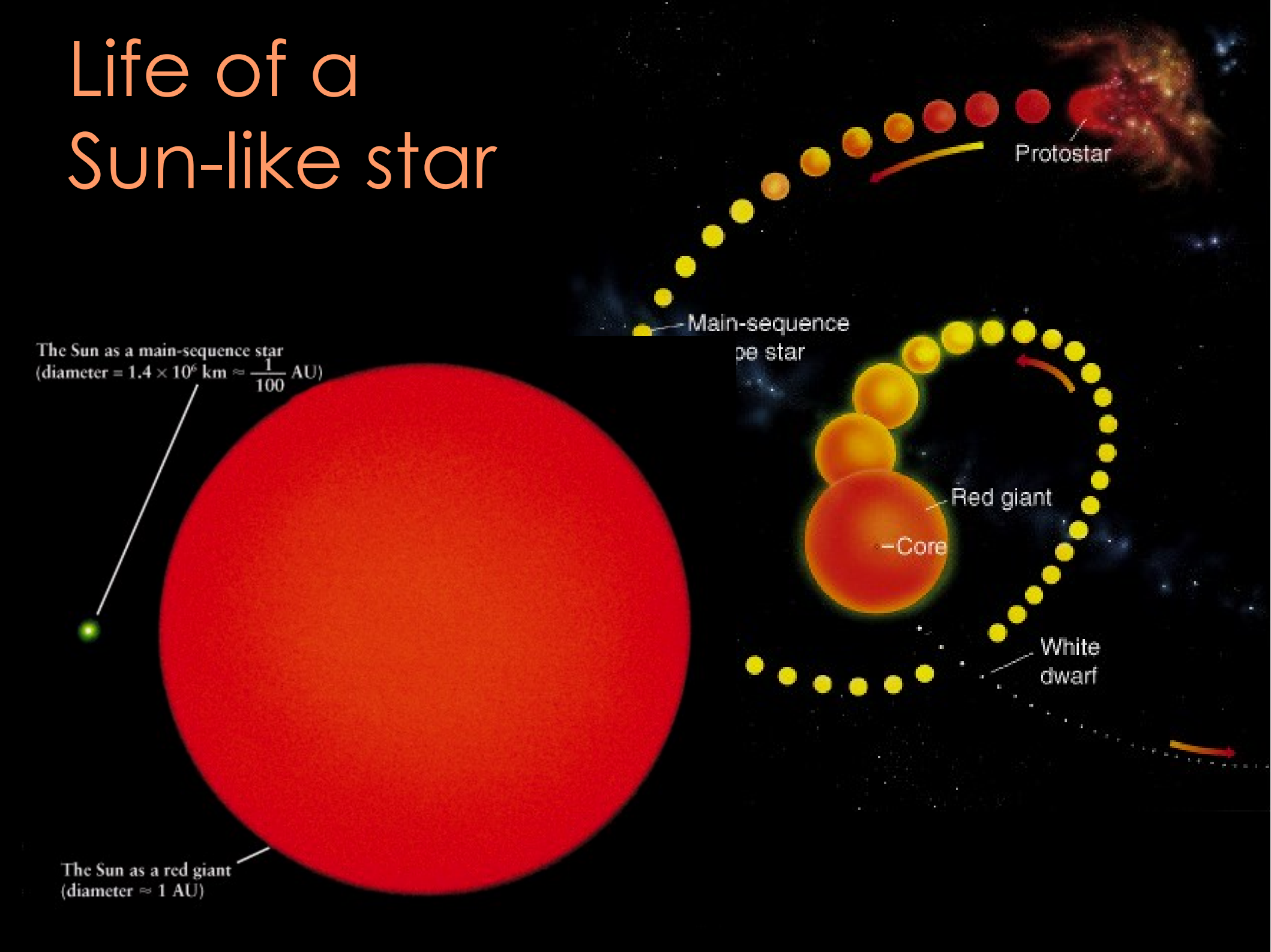


Hubble Heritage

PRC98-39 • Space Telescope Science Institute • Hubble Heritage Team



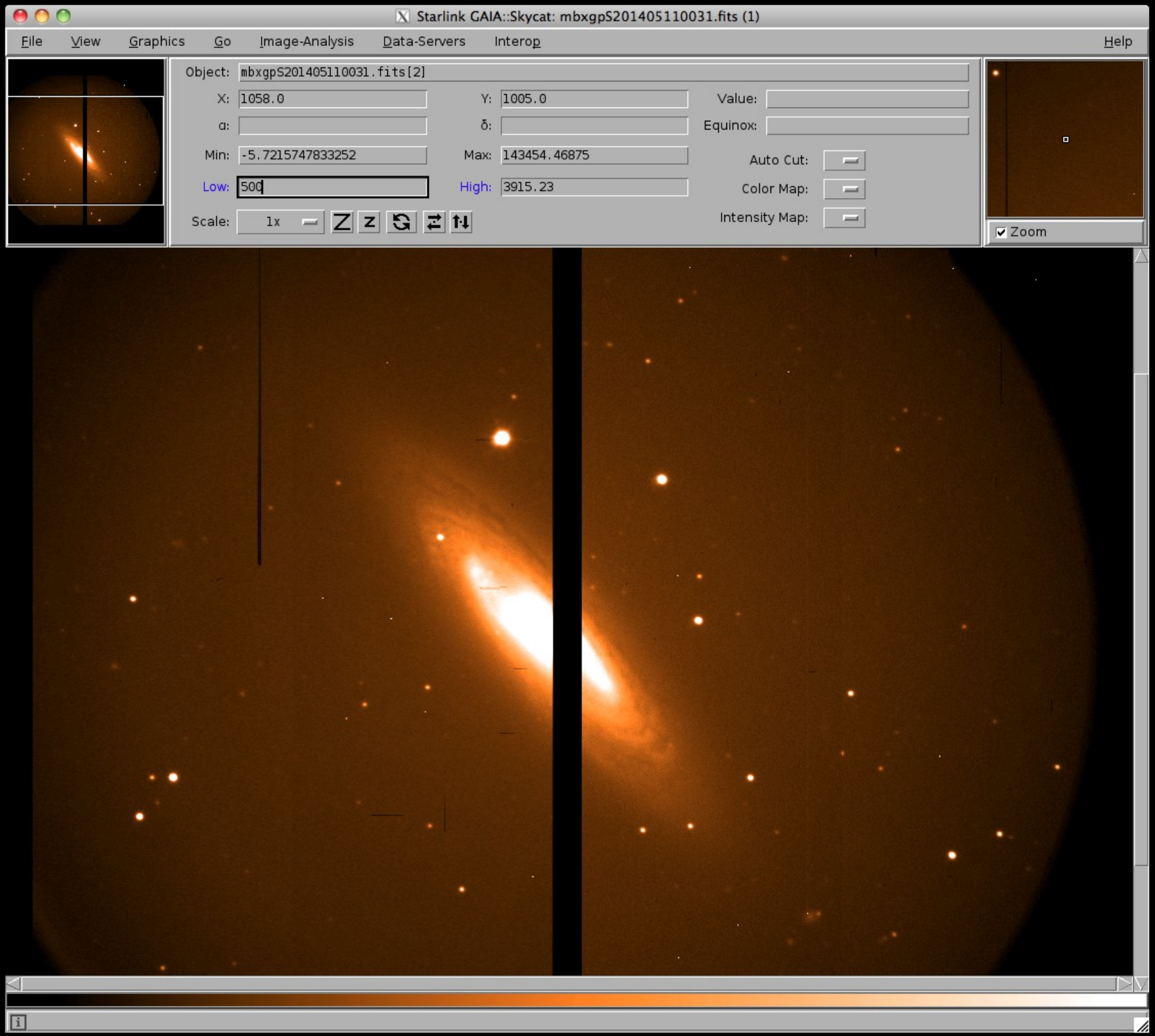
# Life of a Sun-like star



SUPERNOVA

SN 1987A

Crab Nebula – remnant of **supernova** seen on the sky 1054 AD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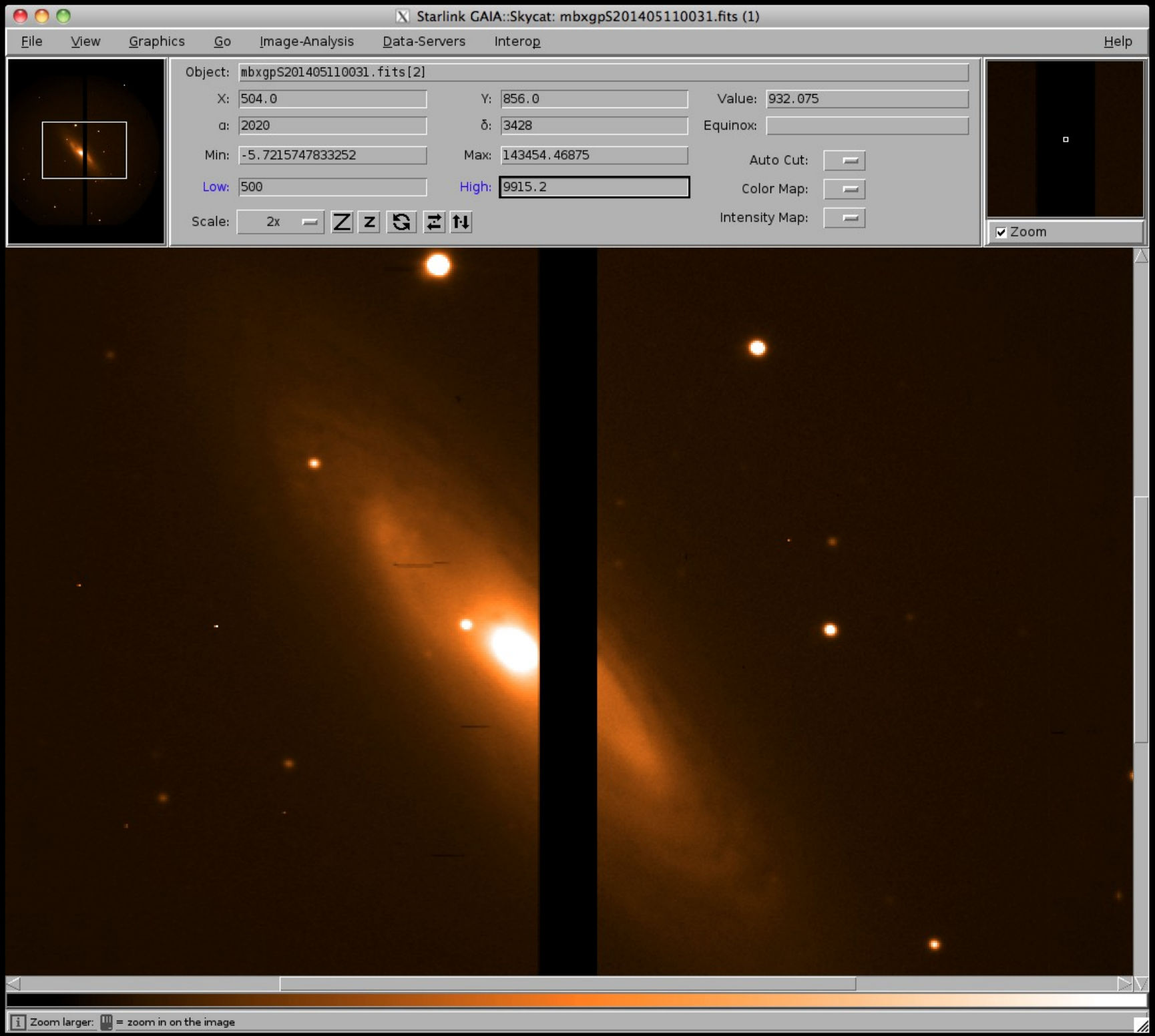
Intensity Map:
Zoom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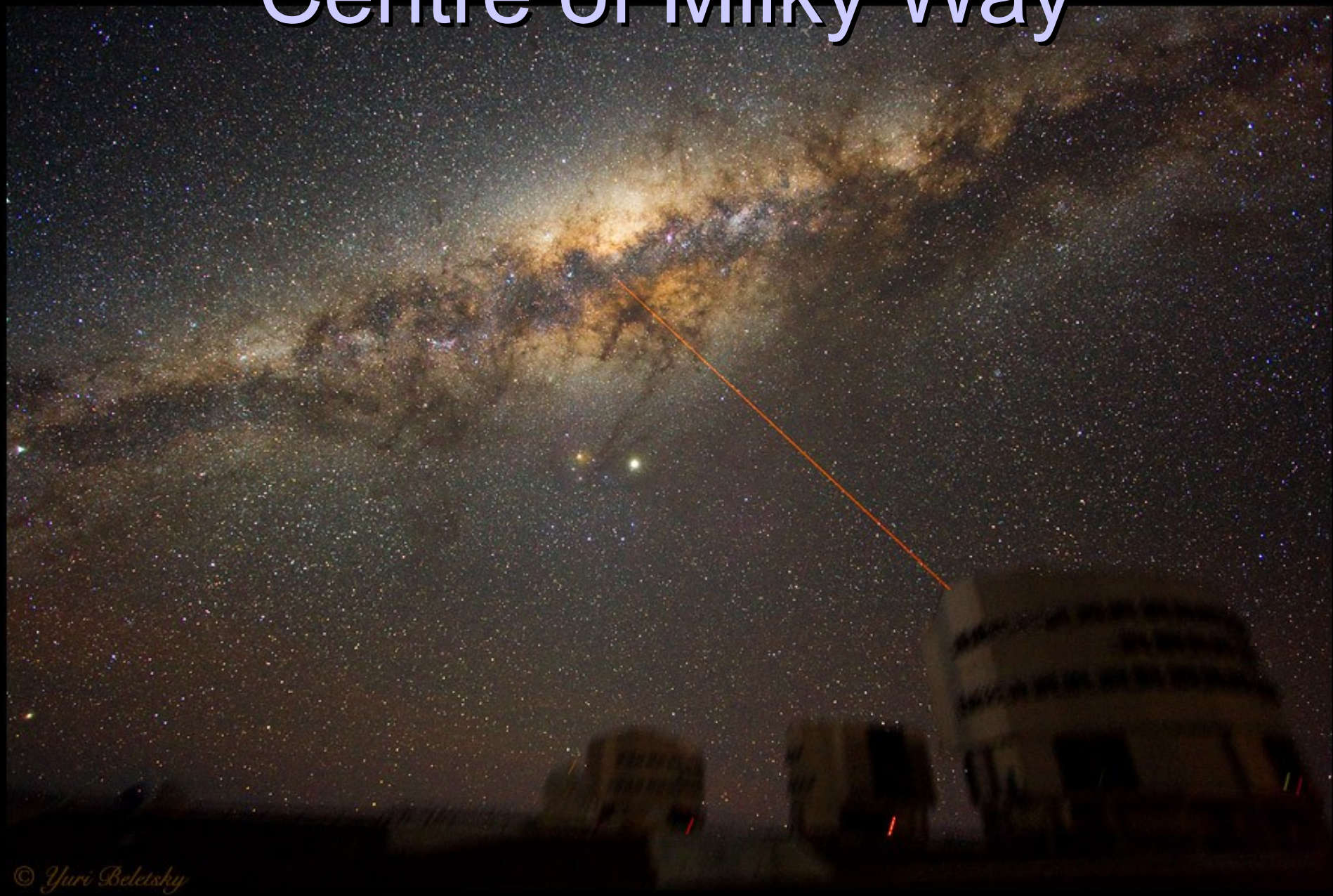
Intensity Map:
Scale: 2x
Zoom
Zoom larger: = zoom in on the image

# Milky Way – our Galaxy

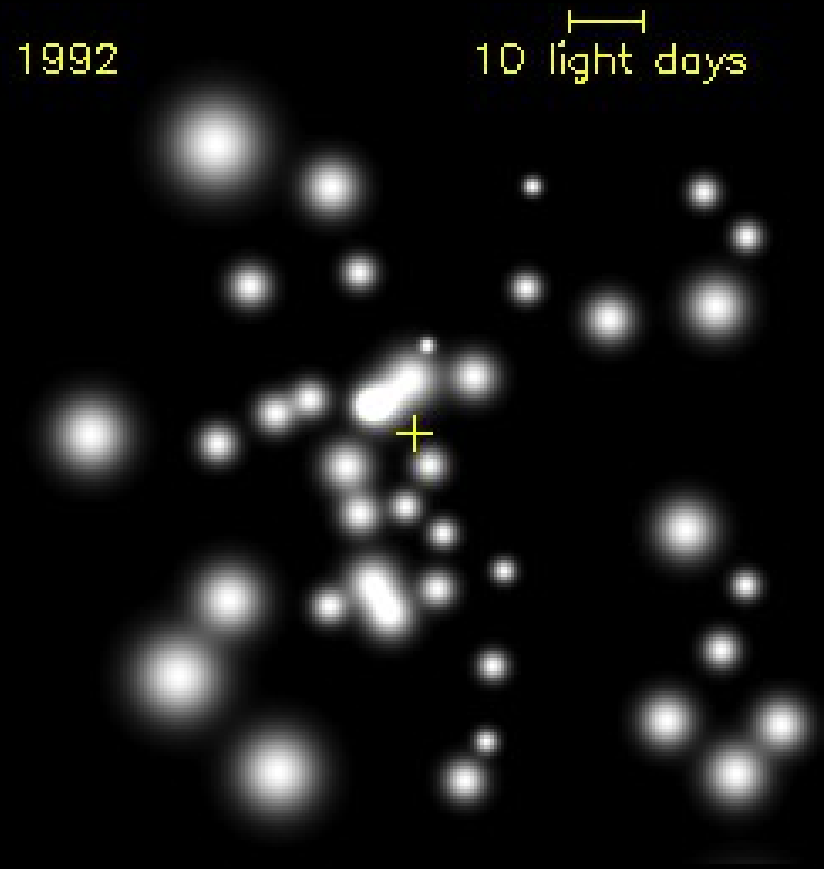
# Centre of Milky Way



# Centre of Milky Way

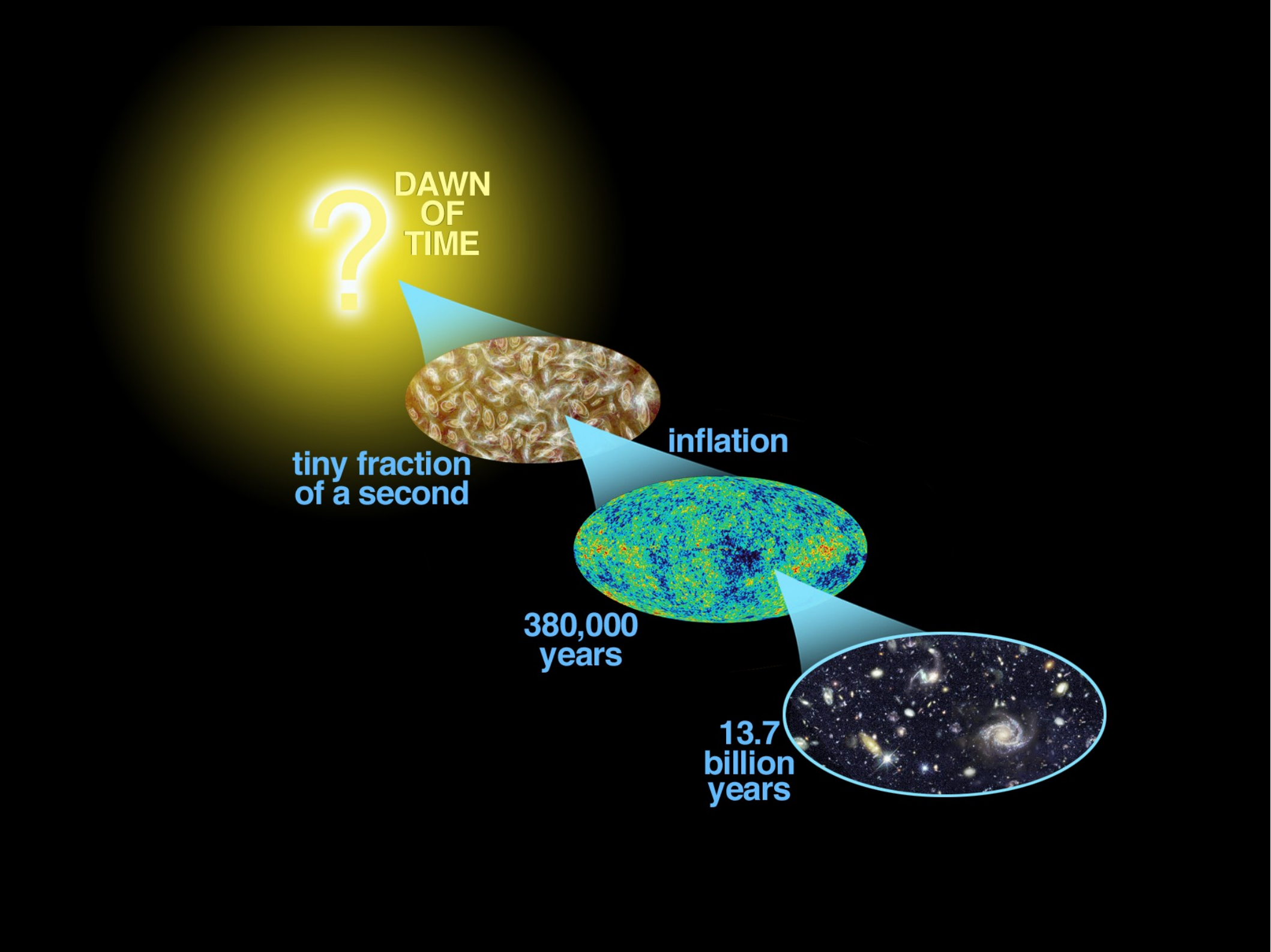
# Centre of Milky Way

- Super-massive Black hole of ~$4 \times 10^6$ Solar mass

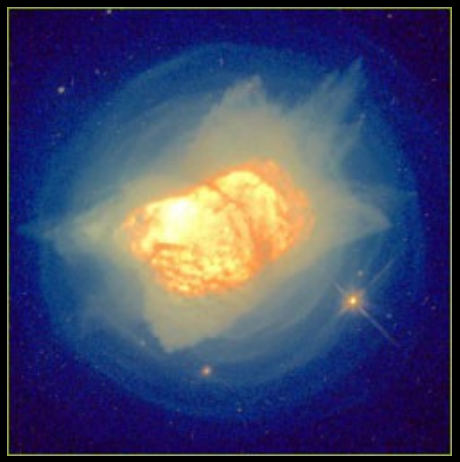



Andromeda galaxy M31

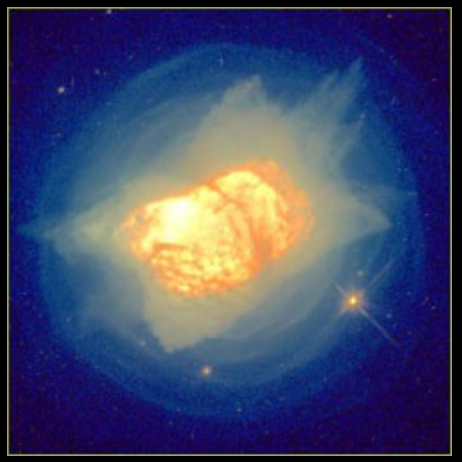

LOOKING INTO THE DEPTHS
OF TIME AND SPACE
We are looking back in time !


?
DAWN
OF
TIME
tiny fraction
of a second
inflation
380,000
years
13.7
billion
years

- Jan 1 THE BEGINNING
- April our Galaxy
- Sep Sun and Earth formed

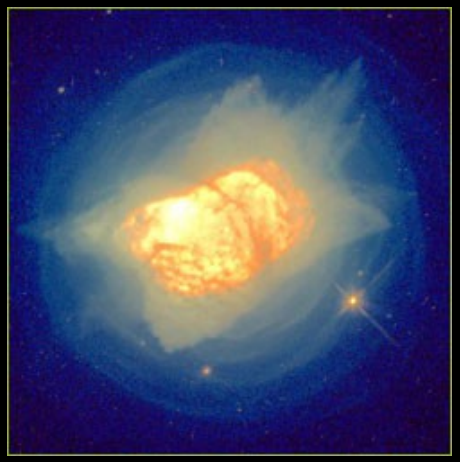


- Jan 1 THE BEGINNING
- April our Galaxy
- Sep Sun and Earth formed



- **DEC** 1 Oxygen atmosphere
- 23 First trees, reptiles on land
- 25 Dinosaurs in
- 26 Mammals
- 29 Dinosaurs out

- Jan 1 THE BEGINNING
- April our Galaxy
- Sep Sun and Earth formed



- **DEC** 1 Oxygen atmosphere
- 23 First trees, reptiles on land
- 25 Dinosaurs in
- 26 Mammals
- 29 Dinosaurs out

- **DEC 31**, 23h00 Homo Sapiens
- 23:56 latest Ice Age
- 23:59:20 agriculture
- 23:59:50 Egypt, Sumer
- 23:59:56 Jesus Christ
- 23:59:59 Renaissance, New World