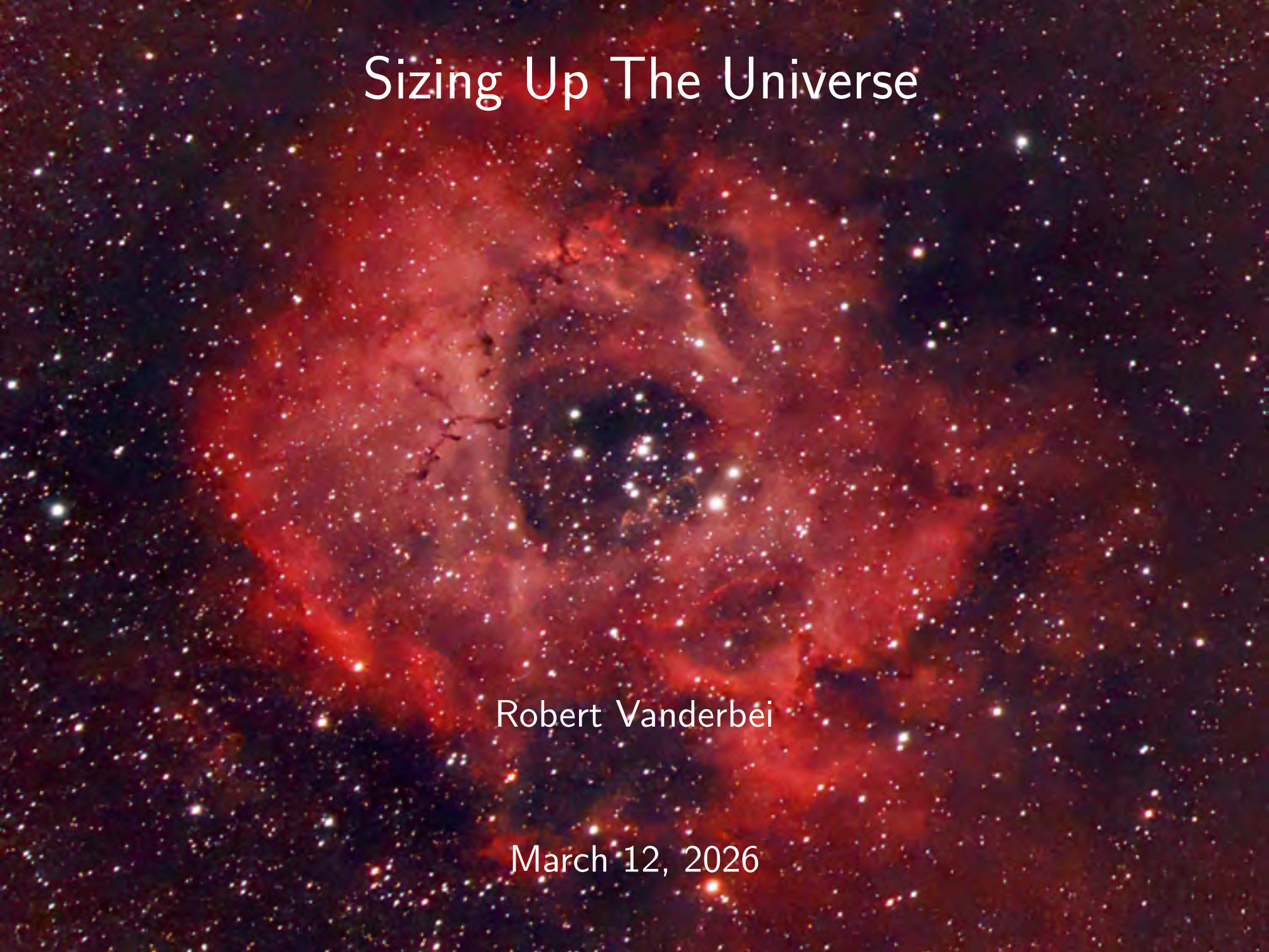


Sizing Up The Universe

Robert Vanderbei

March 12, 2026

A Little About Me

- Born/Raised: Grand Rapids, MI
- Undergrad: Chemistry, 1976, Rensselaer Polytechnic Institute
- Grad: Applied Math, 1981, Cornell
- Postdocs:
  - NSF Fellow, Math, NYU
  - Visiting Lecturer, Math, Univ. of Illinois Urbana/Champaign
- Industry:
  - AT&T Bell Labs, Math Research Center
- Academia: Princeton, 1990-present
- Hobbies/Passions:
  - Soaring
  - Tennis
  - Astronomy
  - Photography
  - Math/Computation
  - Local Warming, Purple America, etc.

Is The Earth Flat?

A Picture's Worth a Thousand Words...

How Aristarchus measured the size of the Moon.

who first discovered that Ear

google.com/search?q=who+first+discovered+that+Earth+is+spherical&rlz=1C5GCEM_en&oq=who+first+discovered+that+Eart...

Google who first discovered that Earth is spherical

AI Mode | All | Images | Forums | Videos | Shopping | News | More | Tools

AI Overview





Ancient Greek philosophers and mathematicians first discovered that the Earth was round, with the concept originating as early as the 6th century BC by Pythagoras and being firmly established by the 4th century BC by Aristotle, who cited evidence like shadows during lunar eclipses. Later, around 240 BC, Eratosthenes proved it and calculated its circumference. Replogle Globes +4

Key Discoveries and Evidence:

- **Early Proponents (6th-5th Century BC):** Pythagoras is often credited with first

Ancient Scholars Proved Earth is Round

Eratosthenes, a Greek polymath and...

YouTube · SCStateParks

The Shape of the Earth

Aristotle (384-322 BC) was one of the first to recognize that the Earth is a round sphere. He...

ESO.org

Flat Earth - Wikipedia

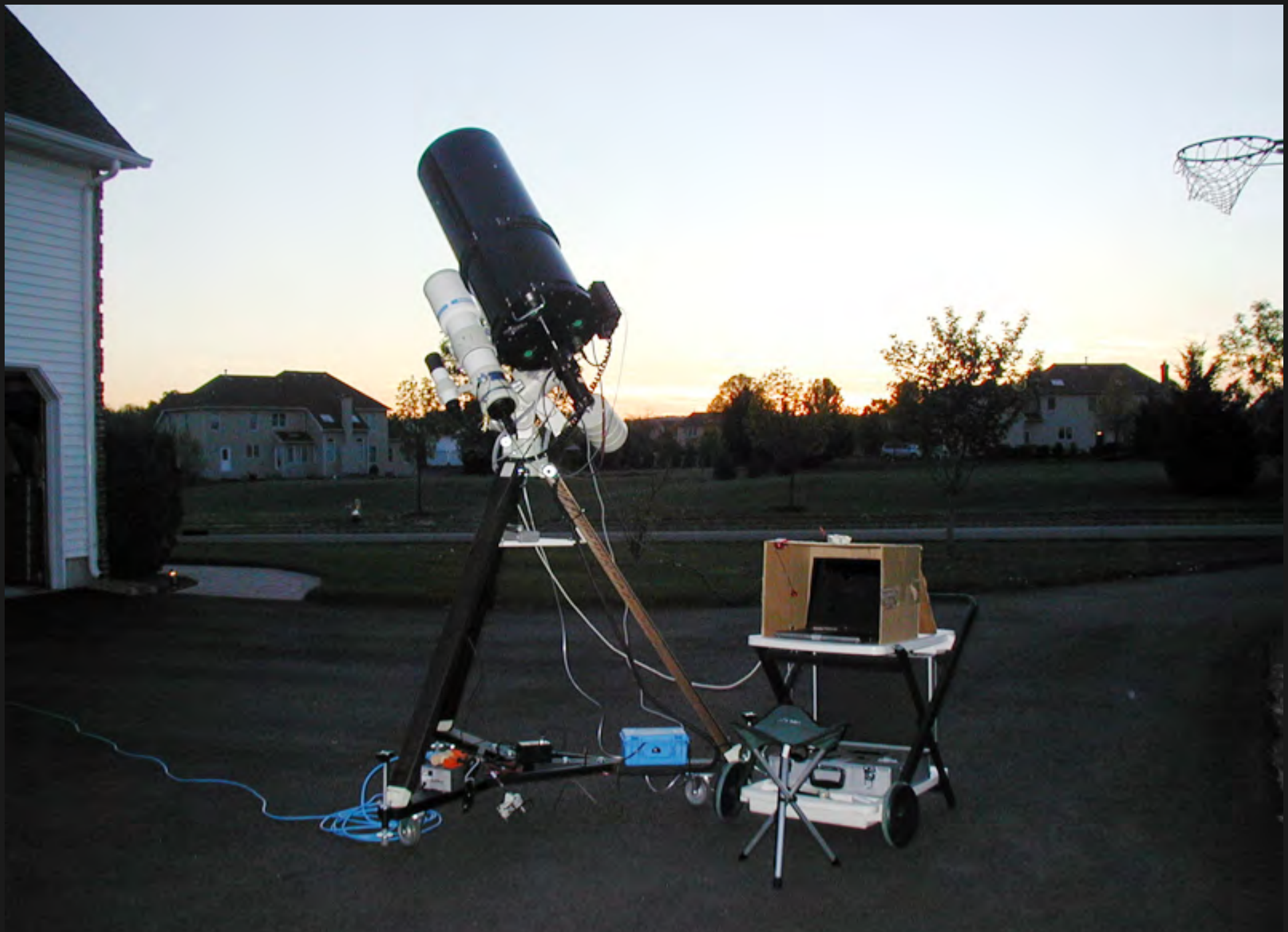
Greece: spherical Earth ... Pythagoras in the 6th century BC and Parmenides in the 5th century...

Wikipedia

Equipment: 10” Reflector, 4” Refractor, Digital Camera

Move equipment outside.

Ready To Go...



Halloween's Blue Moon

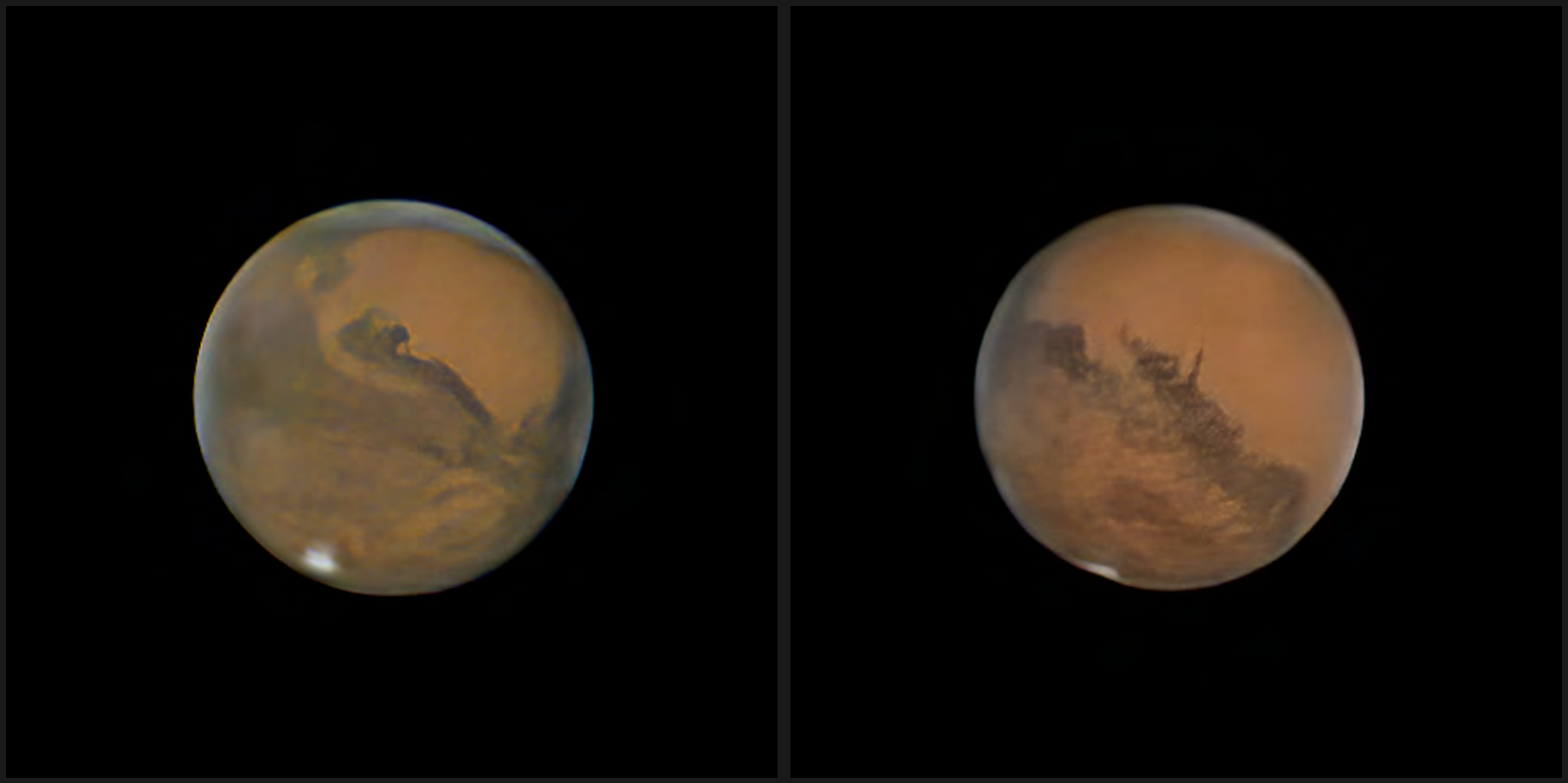
Oct. 31, 2020

Moon

1.1 sec

Mars

Oct. 6 and 18, 2020

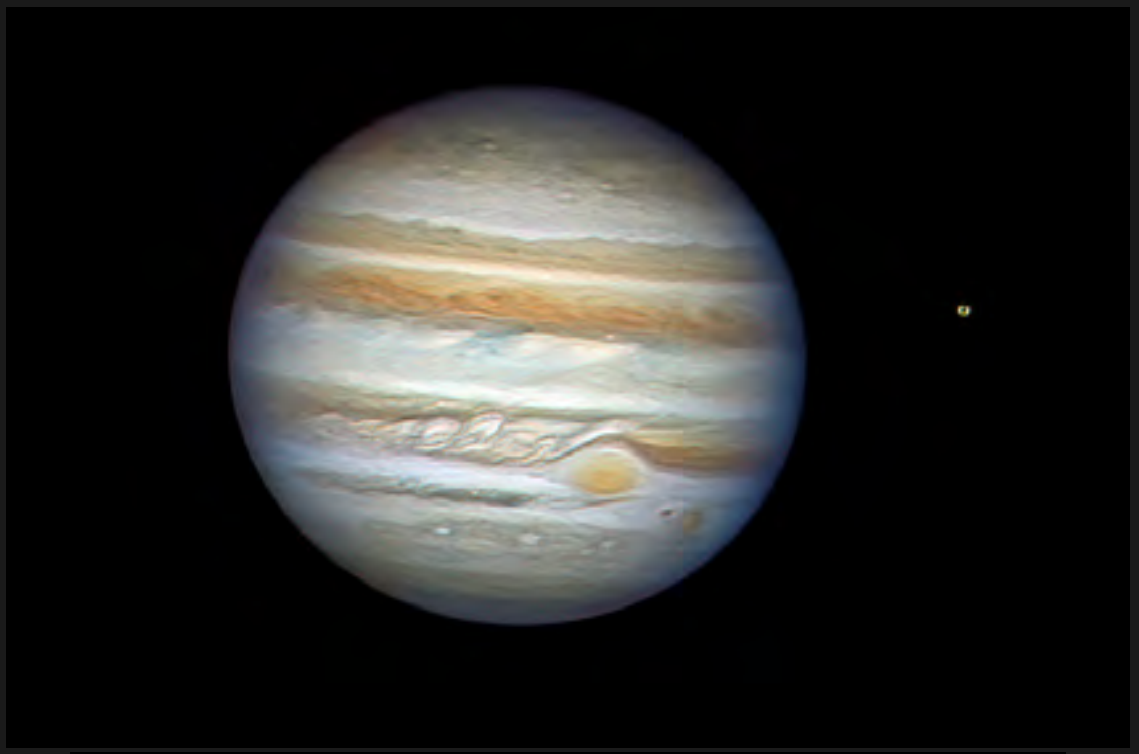


Moon and Mars

Jan. 13, 2025

Jupiter and Saturn

32 and 67 min



Jupiter and its Galilean Moons

Comet 103P / Double Cluster

1.2 min / 7,460 and 7,640 yrs

Looking Out Beyond Our Solar System

Distance Measurements

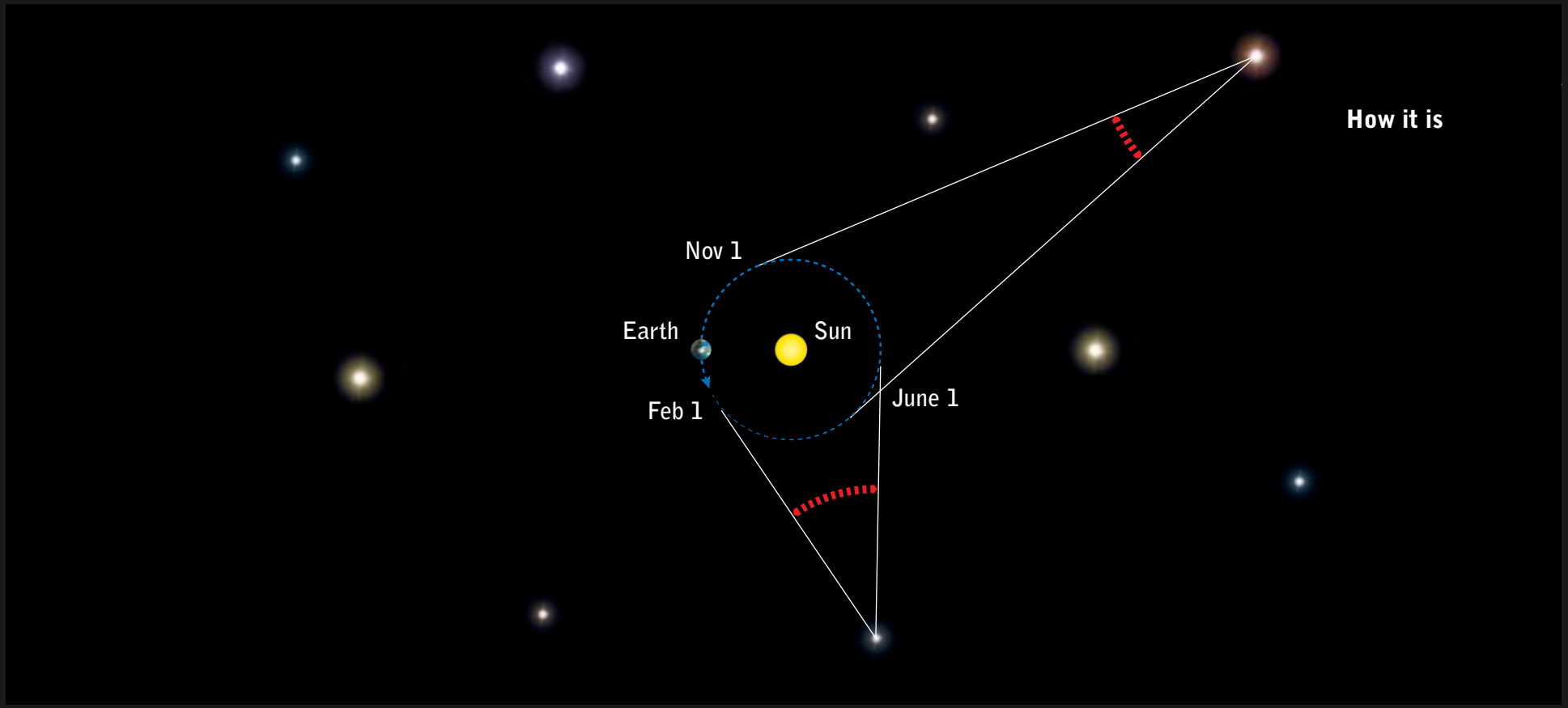
There are various ideas/methods for measuring distances.

The simplest is called **parallax**.

Using parallax, we can measure the distance to nearby stars.

For things further away, we need more clever/subtle methods.

Parallax: Distance to the Stars



Barnard's Star

Barnard's Star

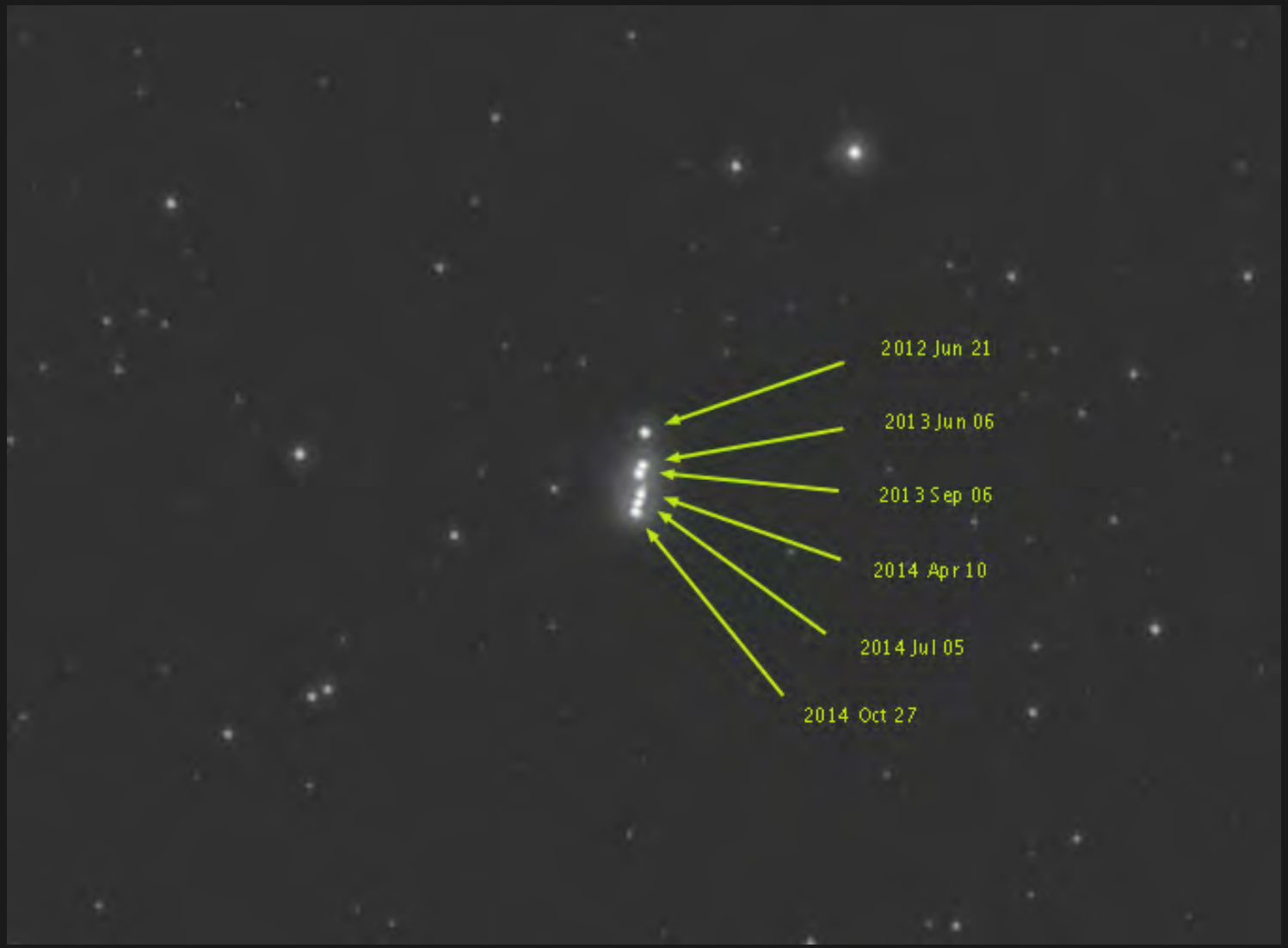
Barnard's Star

Barnard's Star

Barnard's Star

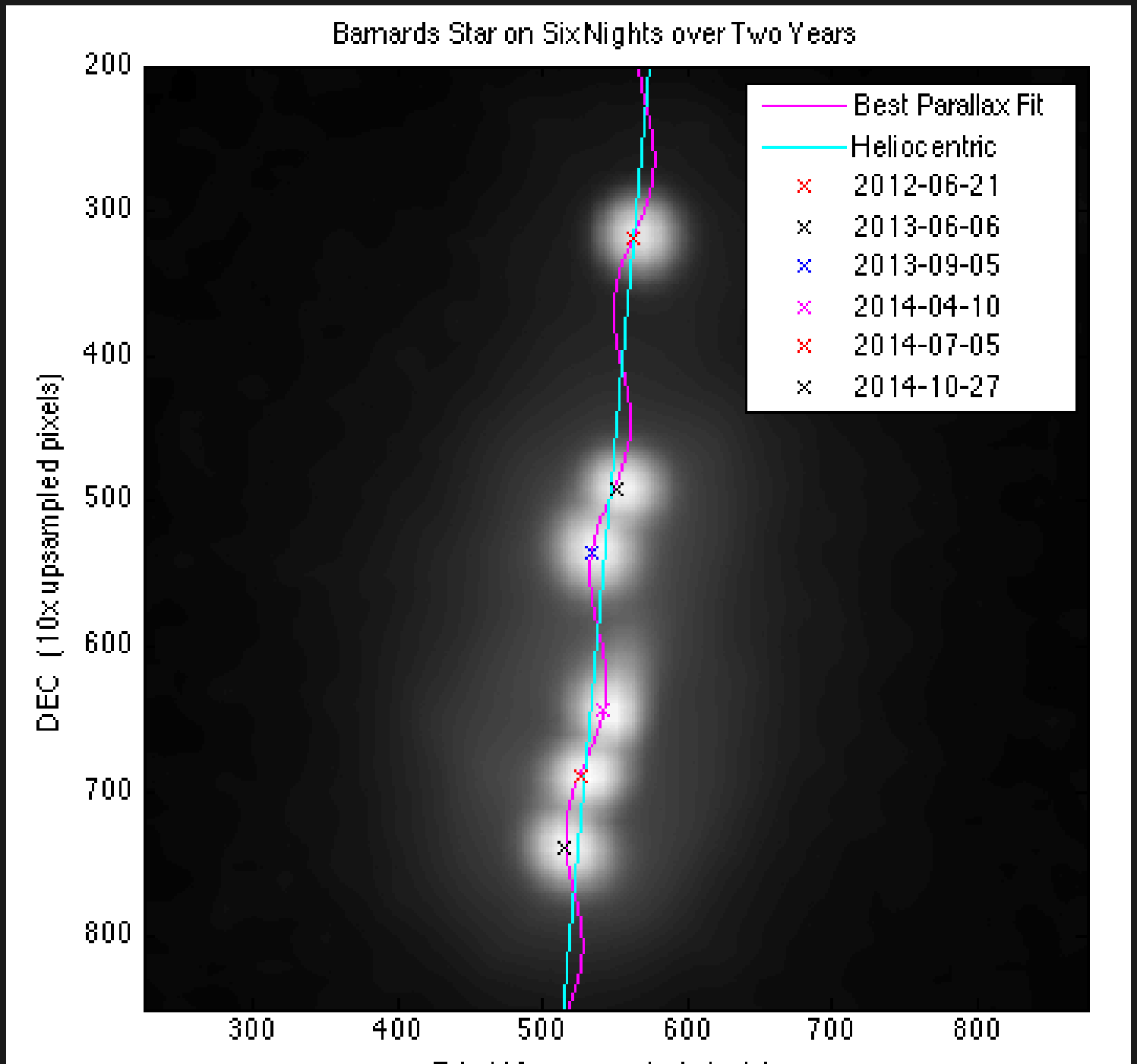
Barnard's Star

Barnard's Star Overlay



Barnard's Star Closeup

6.0 yrs




Orion Nebula: M42
1,344 yrs


Dumbbell Nebula
1,360 yrs

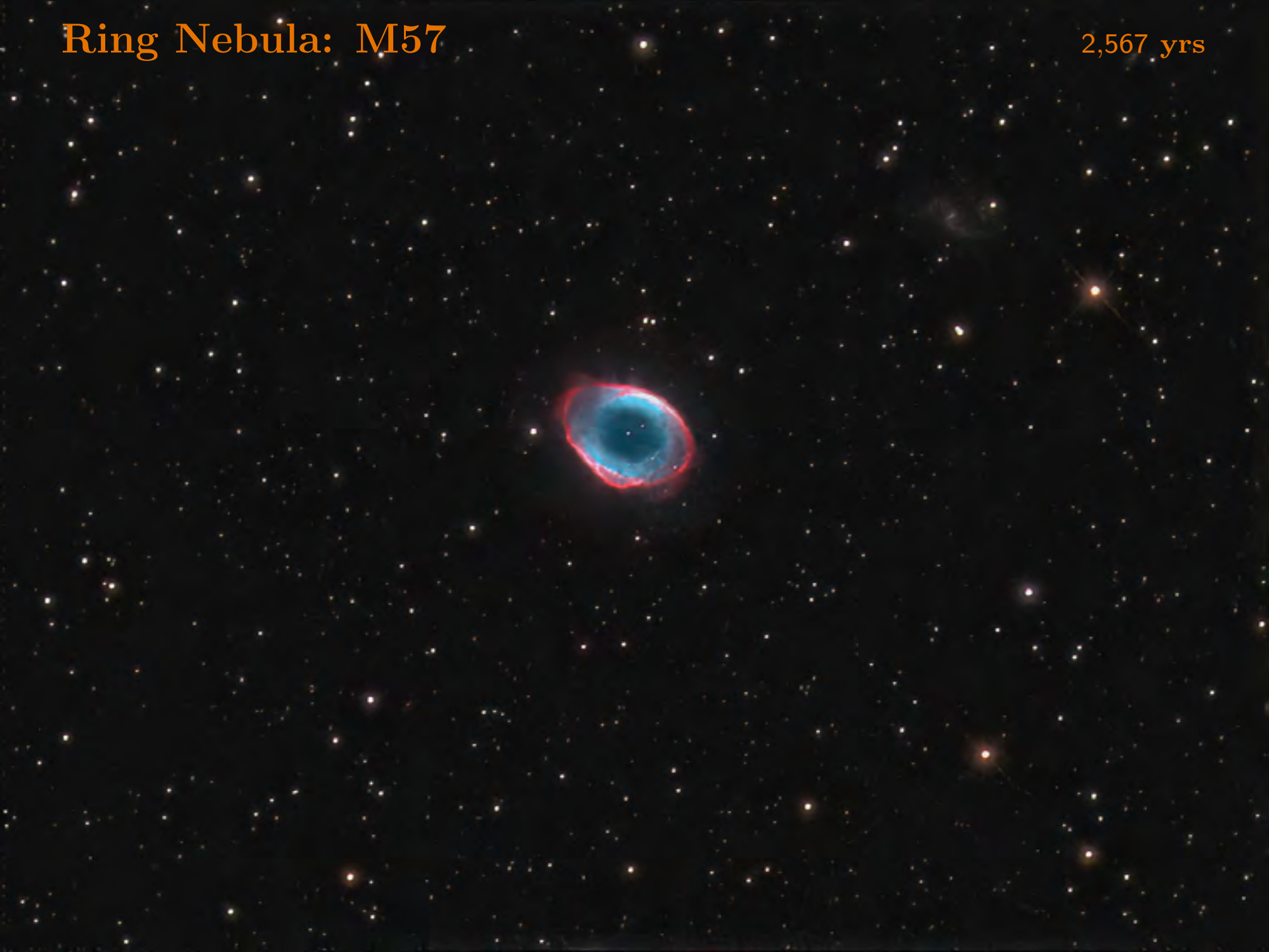
Veil Nebula: NGC 6960 and 6992

2,400 yrs


Western Veil: NGC 6960
2,400 yrs

Eastern Veil: NGC 6992

2,400 yrs


Ring Nebula: M57
2,567 yrs


Crescent Nebula: NGC 6888
5,000 yrs

Jellyfish Nebula: IC 443

5,000 yrs

Rosette Nebula: NGC 2237

5,200 yrs

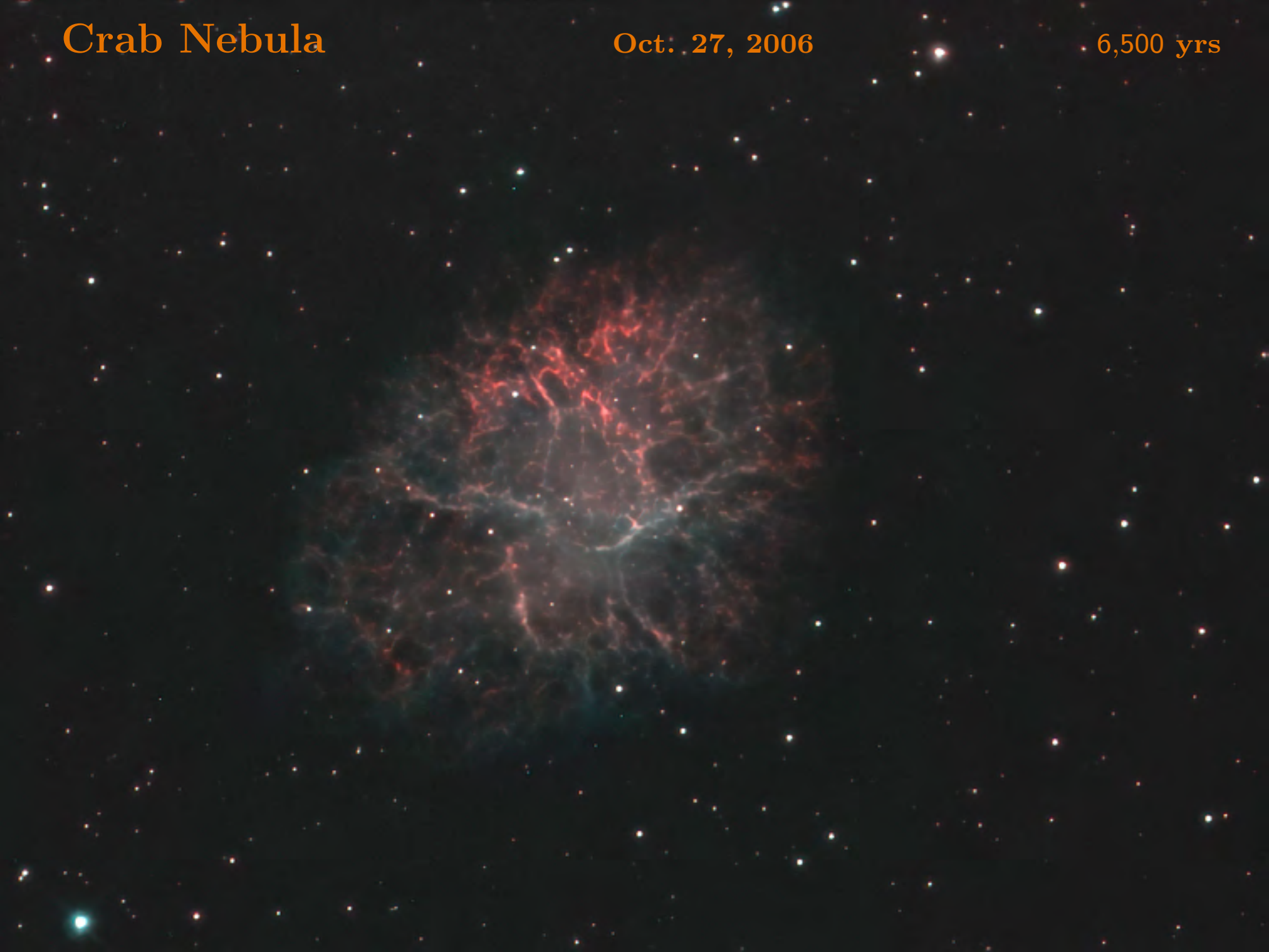
Eagle Nebula: M16

5,700 yrs

Eagle Nebula: M16

5,700 yrs


Crab Nebula
Mar. 26, 2019
6,500 yrs


Crab Nebula
Oct. 27, 2006
6,500 yrs


Bubble Nebula
9,100 ± 2,000 yrs


Globular Cluster M13
22,200 yrs

Looking Out Beyond Our Milky Way

The Andromeda Galaxy

2,450,000 yrs

M81 and M82

12,000,000 yrs

The Whirlpool Galaxy

31,000,000 yrs

The Whirlpool Galaxy

31,000,000 yrs

The Whirlpool Galaxy

31,000,000 yrs

The Leo Trio

32,000,000 yrs

The Needle Galaxy (NGC 4565)

42,700,000 yrs

Questions?

Kinda Recent Events

Solar Eclipse seen in Plattsburgh NY (Apr. 8, 2024)

Lunar Eclipse seen on Poe Field (Nov. 8, 2022)

Lunar Eclipse seen on Poe Field (Nov. 8, 2022)

Lunar Eclipse (Nov. 8, 2022)