

# Looking to the sky with modern eyes

Dr. Álvaro Labiano Ortega

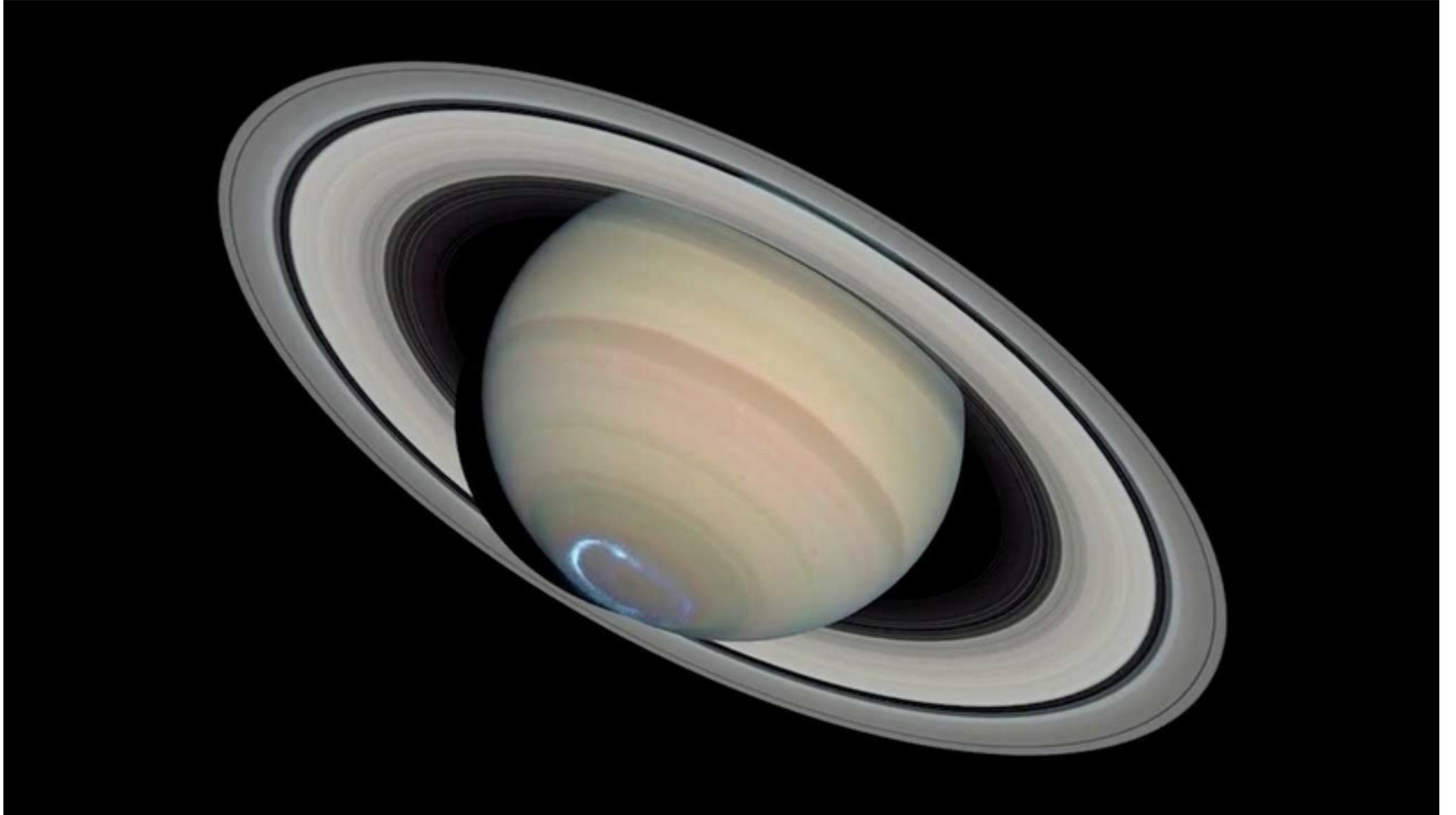
WOODLAWN SCHOOL

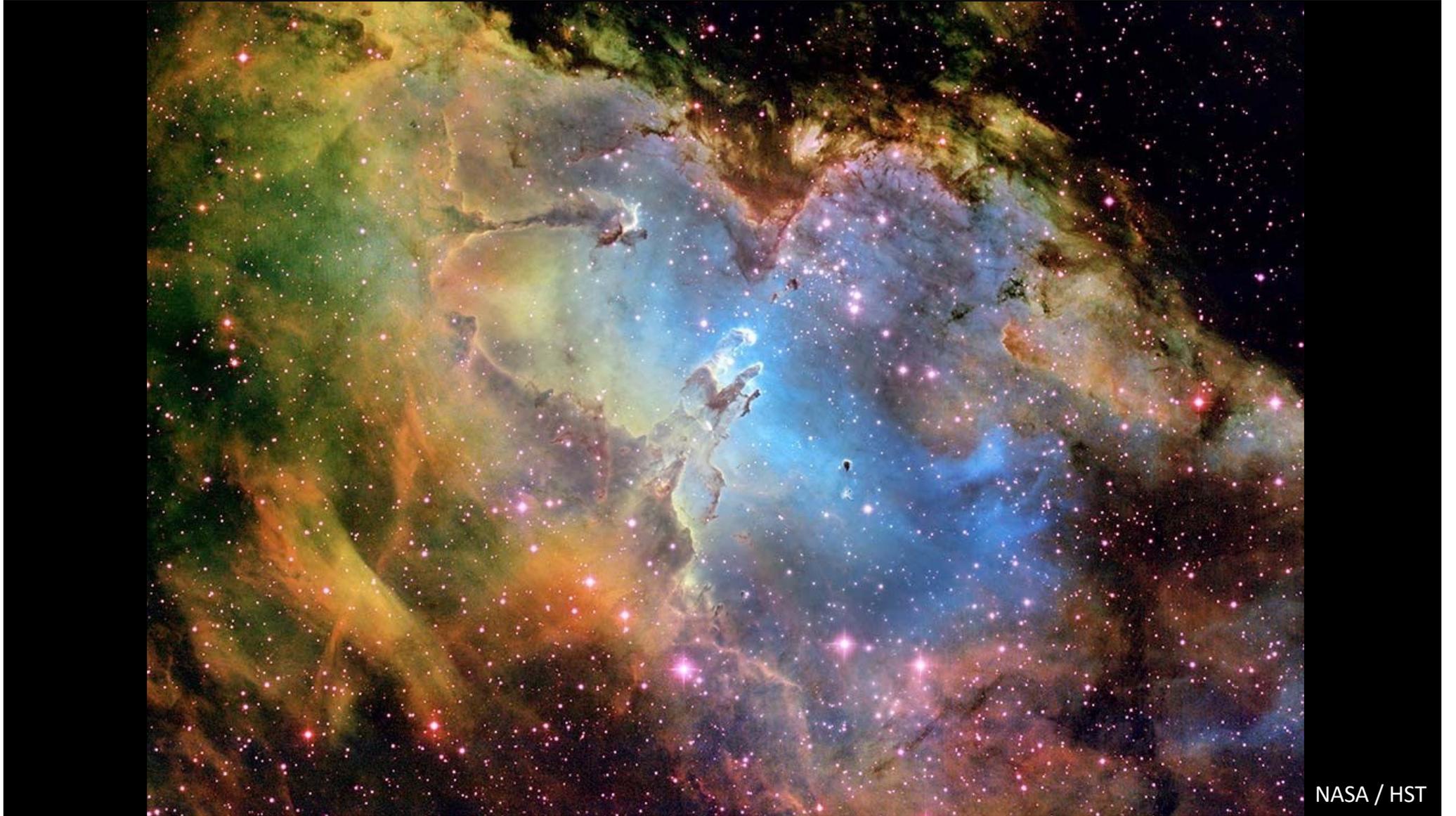
 **STEAMfest**  
IMAGINE · DISCOVER · EXPLORE

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 **CENTRO DE ASTROBIOLOGÍA**  
 **CSIC**  **talento**  **EXCELENCIA MARÍA DE MAEZTU**  
Programa de atención de talento investigador Universidad de Madrid



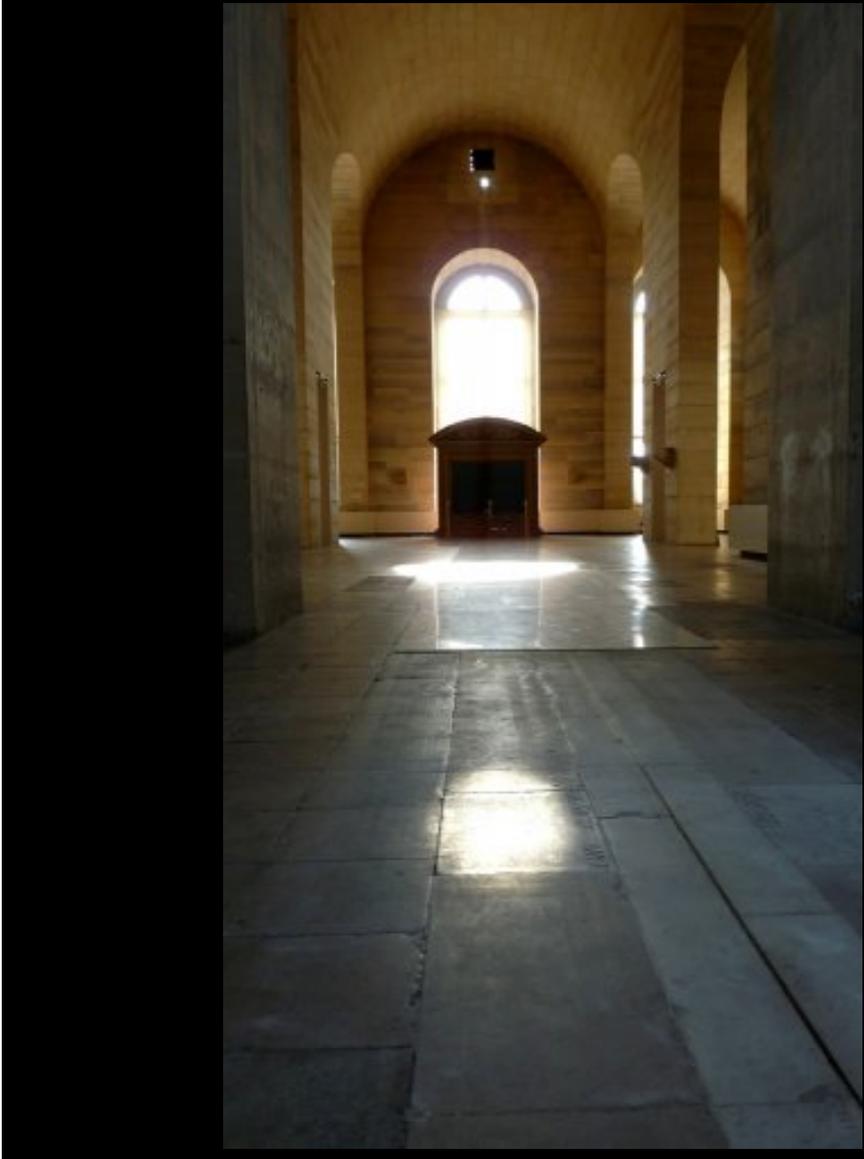




NASA / HST







## The United States Naval Observatory (USNO)

3450 Massachusetts Ave, NW, Washington, DC 20392-5420

USNO strengthens national security and critical infrastructure by serving as DoD's authoritative source for the positions and motion of celestial bodies, motions of the Earth, and precise time. USNO provides tailored products, performs relevant research, develops leading edge technologies and instrumentation, and operates state of the art systems in support of the U.S. Navy, DoD, Federal Agencies, international partners, and the general public.

USNO products support activities in the following areas:

### Astrometry

Integrated Image and Catalog Archive Service, star catalogs, fundamental reference frames, space astrometry.

### Astronomical Applications

Astronomical data calculators (e.g., rise/set times, Moon phase, etc.), information on astronomical phenomena and related topics, astronomical and navigational almanacs, software products.

### Earth Orientation

Daily, weekly, and long-term EO products (e.g. IERS Bulletin A), GPS-based products (rapids, ultra-rapids, UTGPS), VLBI-based products, background information, technical and scientific publications and software.

### Precise Time

USNO Master Clock, Network Time Protocol (NTP) servers, web-based time synchronization, GPS timing products and services, Two-Way Satellite Time Transfer, and Loran-C timing products.

### The James M. Gilliss Library

USNO's library holds one of the most complete collections of astronomical literature in the world.

### Tours & Events

Information on tours of the Naval Observatory, upcoming scientific colloquia, and other events.

### About Us

Information about the U.S. Naval Observatory.



USNO Master Clock  
Time

Thu, 04 Feb 2021  
13:03:00 UTC

The Sky This Week

The Sky This Week,  
2021 February 2 - 9

[More...](#)



Обновления Луны  
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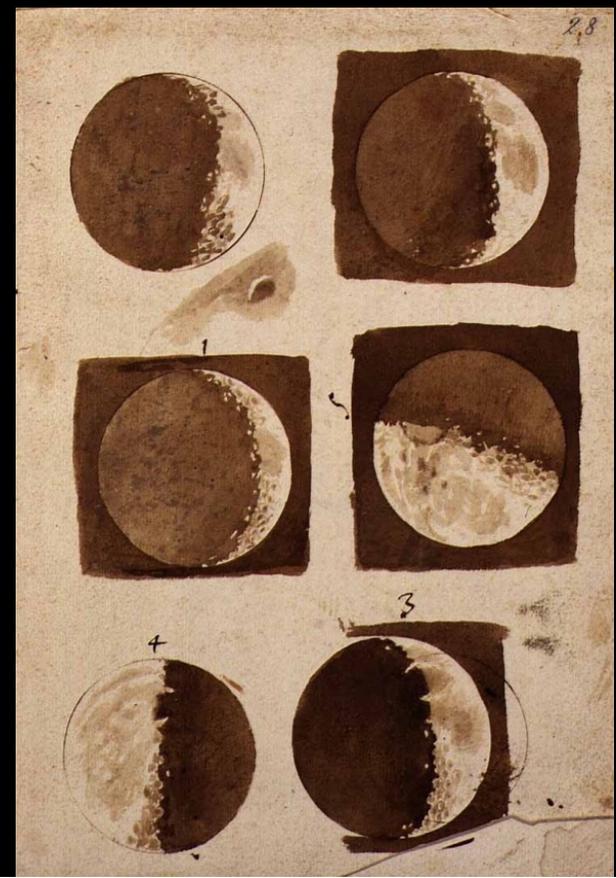
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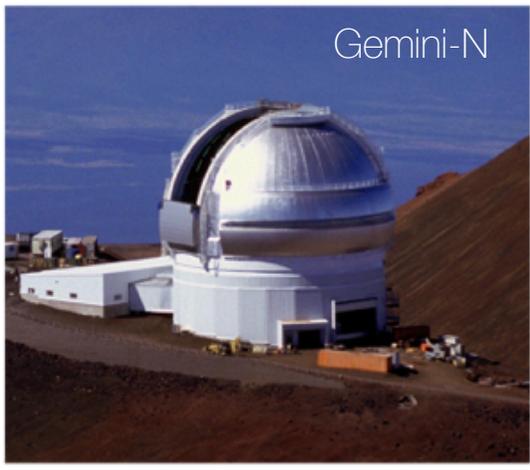


1804

SALT



Gemini-N

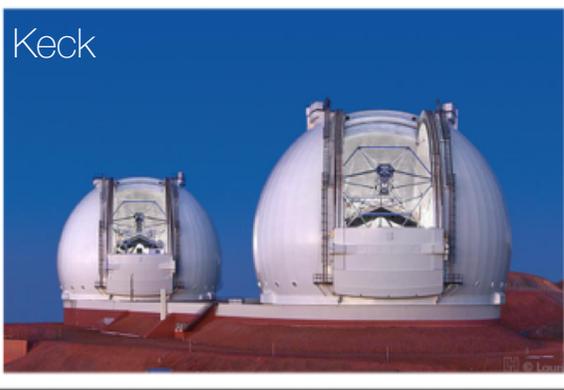


LBT

Gemini-S

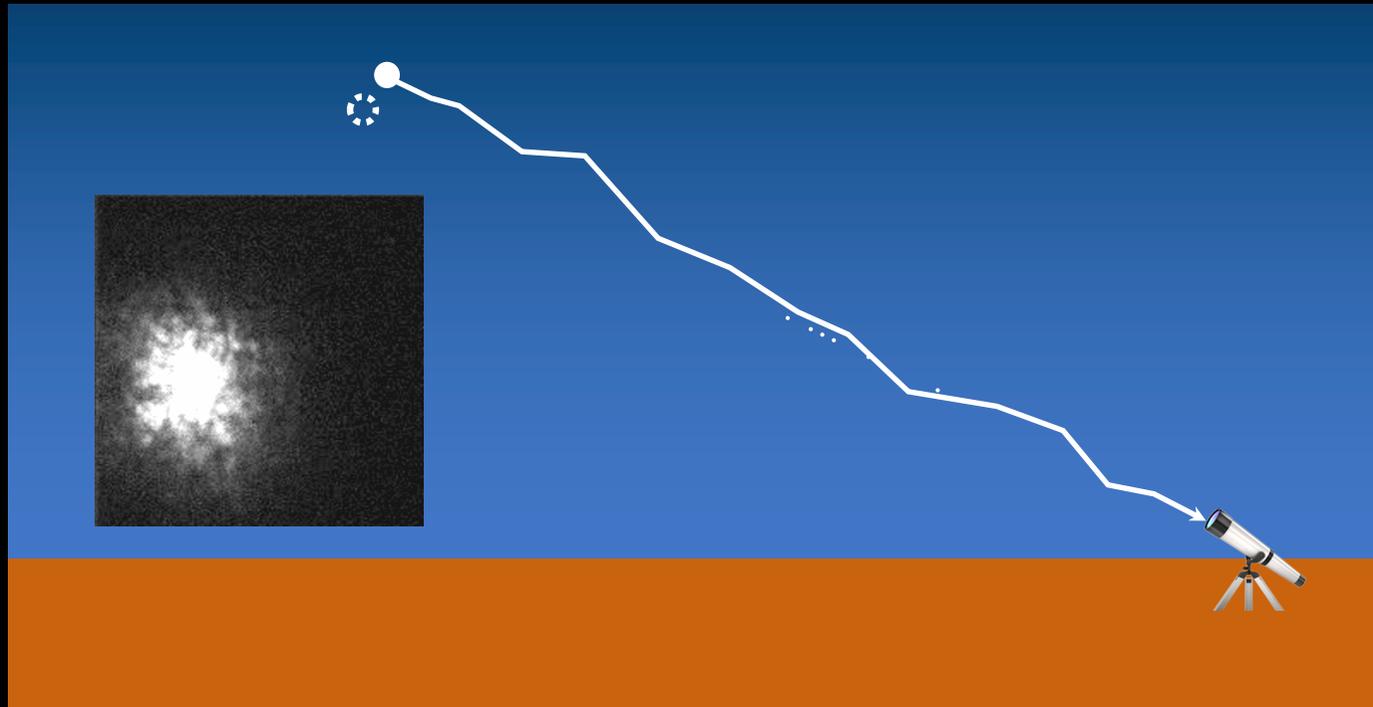


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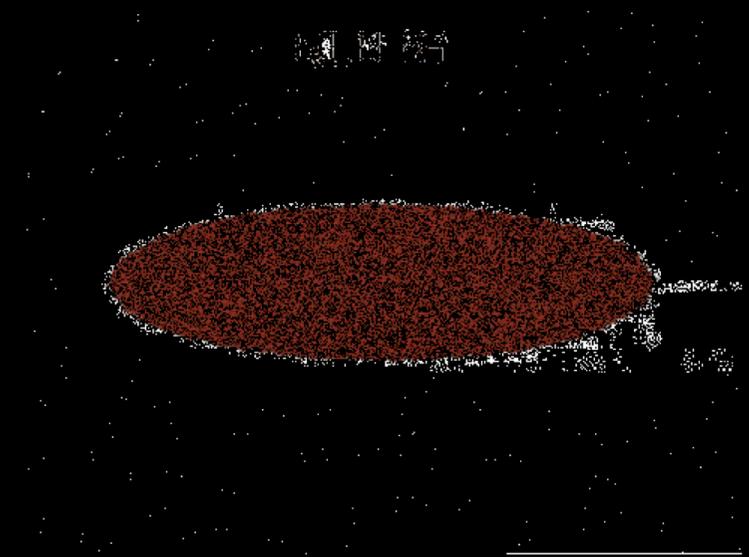


GTC

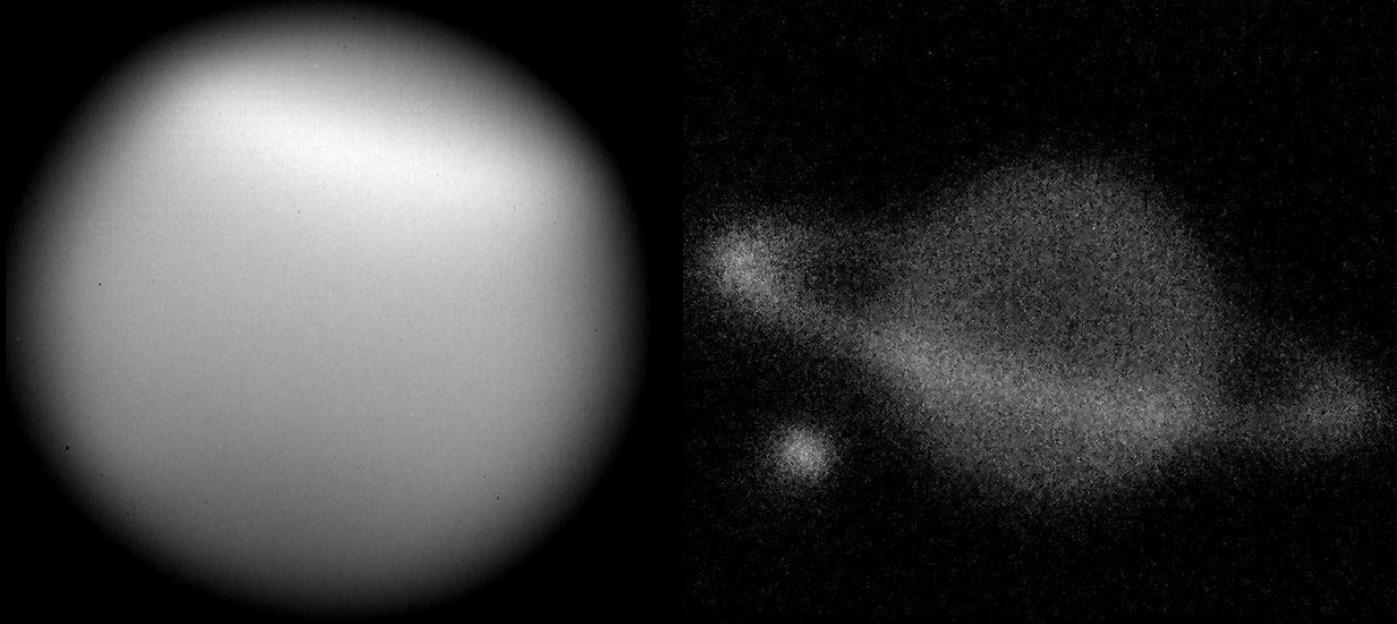




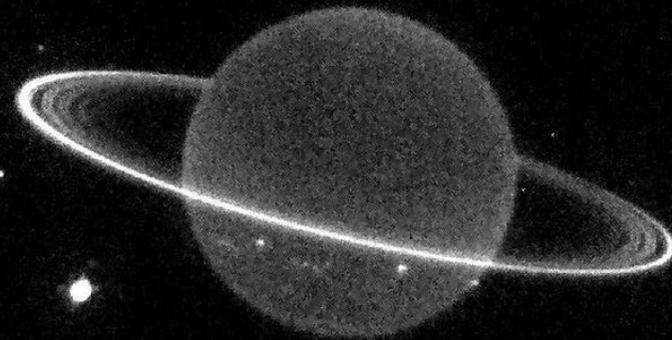
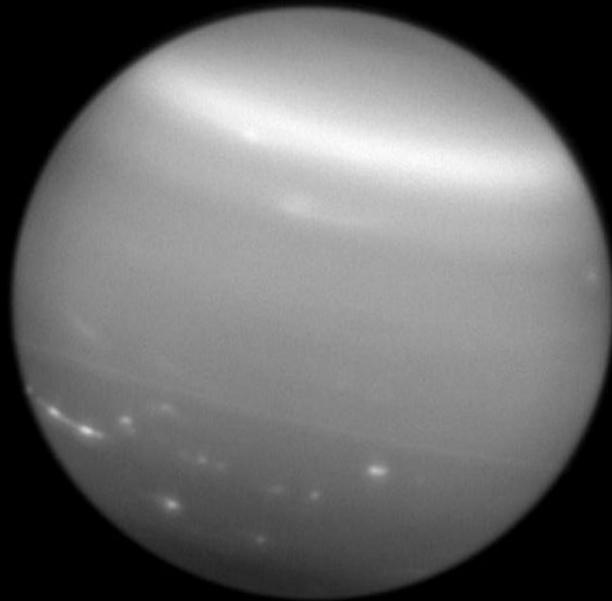
# Adaptative optics

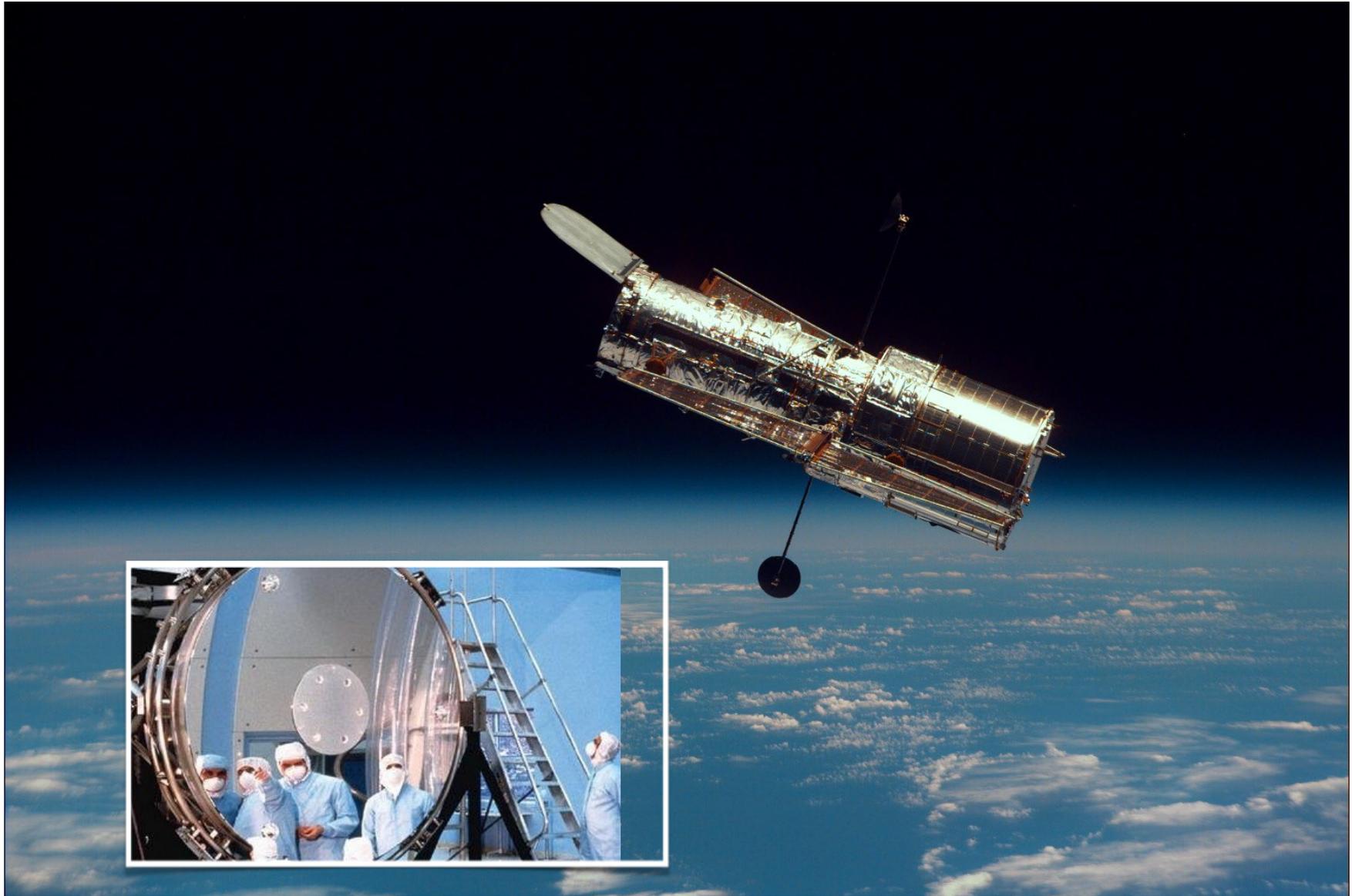


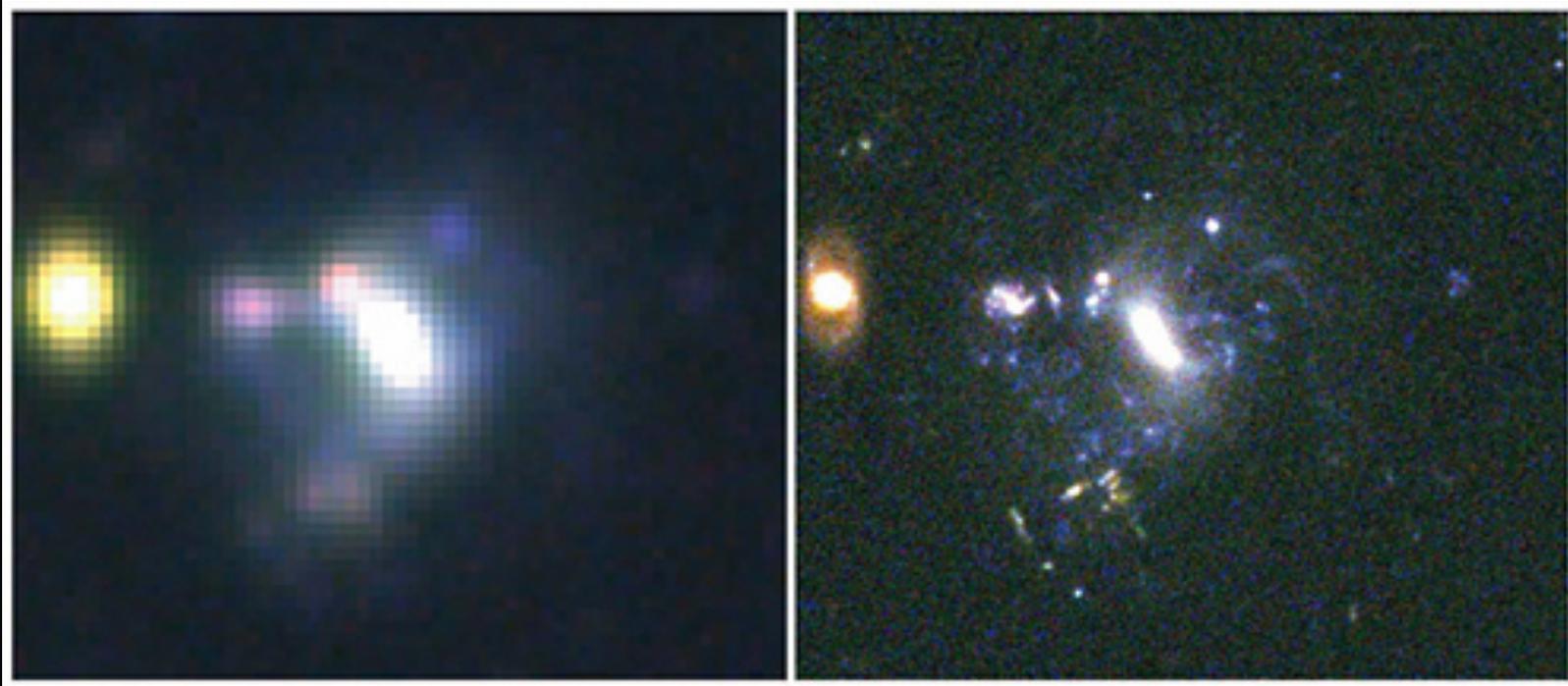
No adaptive optics



# Adaptive optics

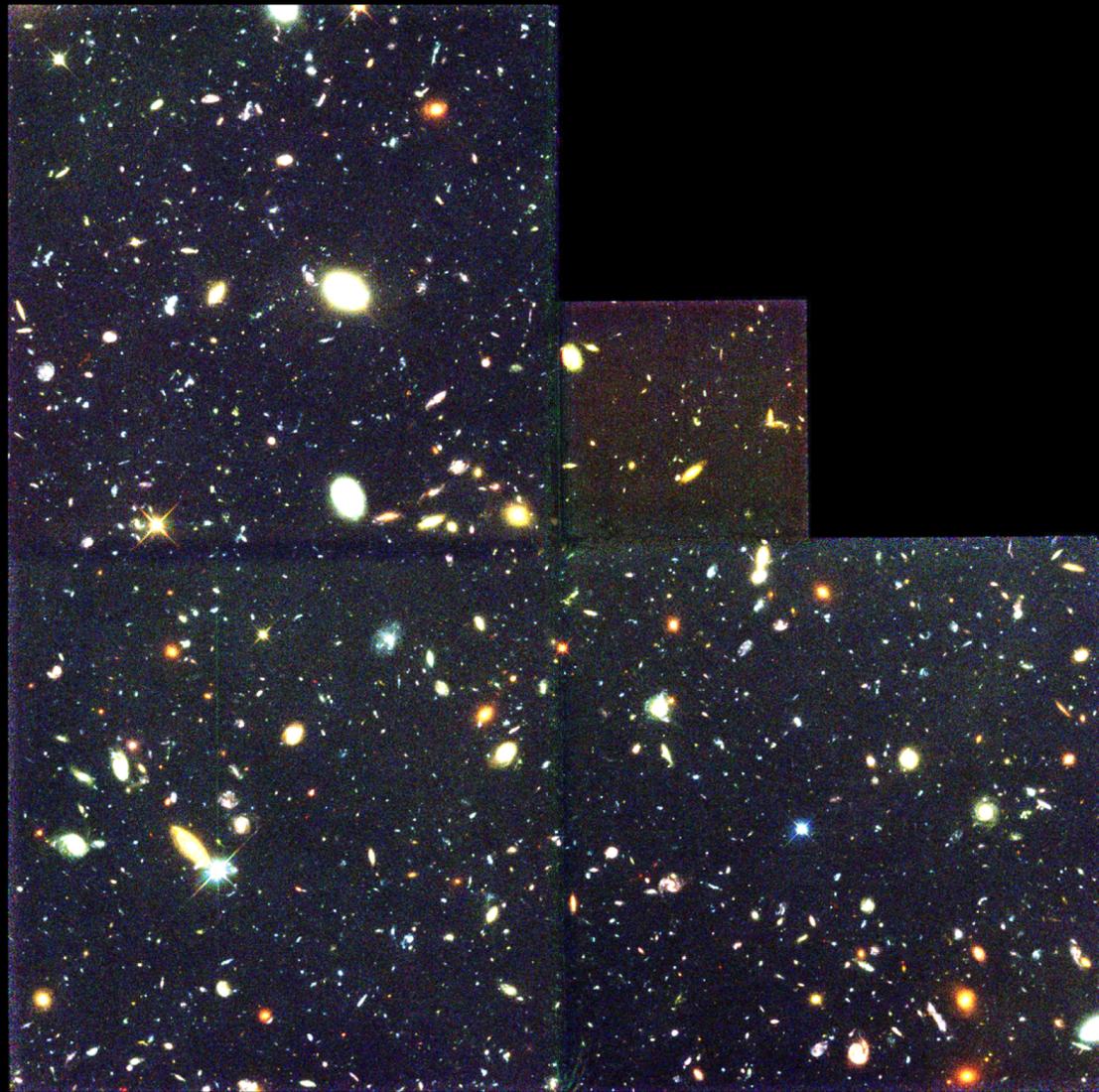


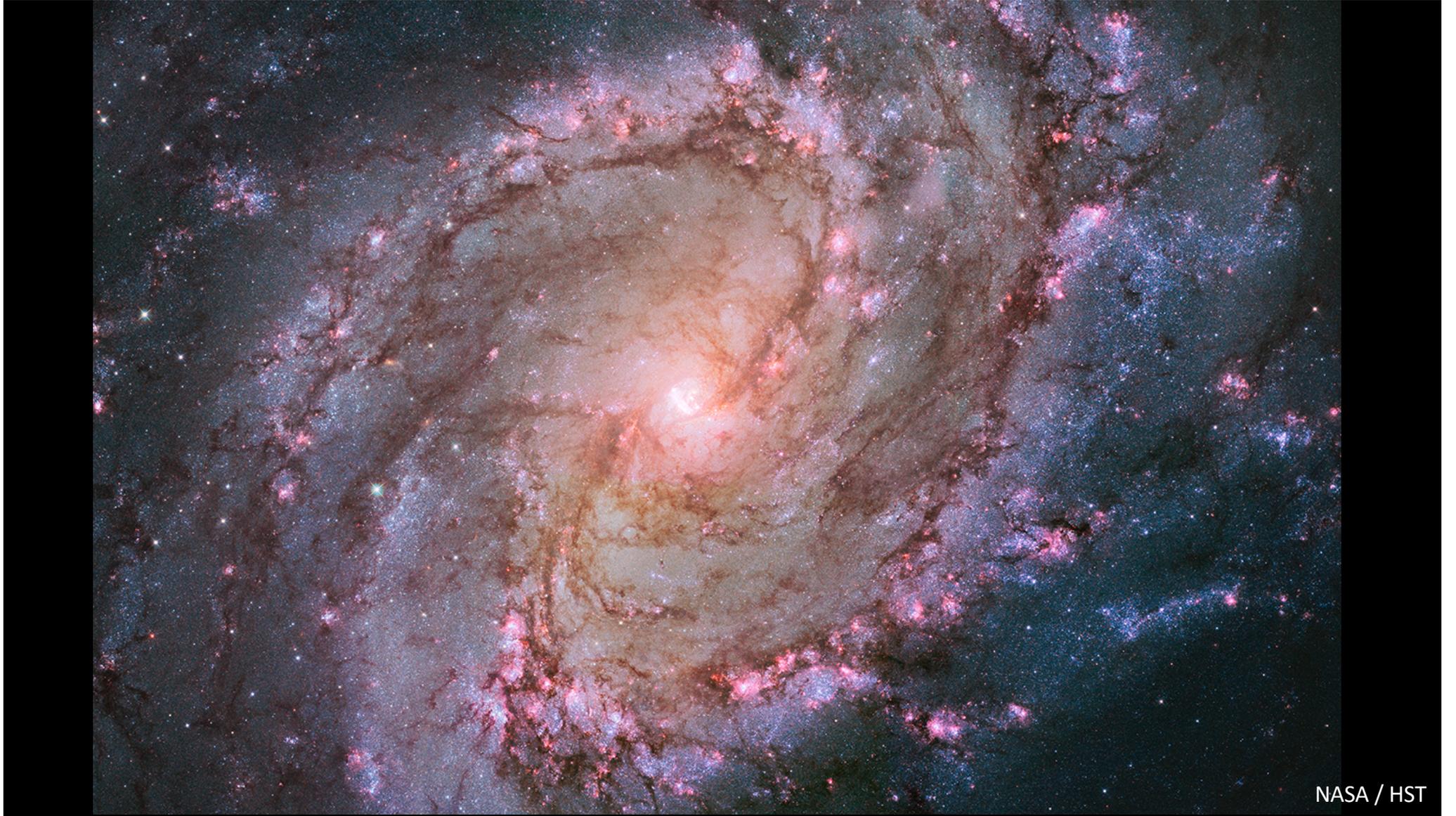






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# JAMES WEBB SPACE TELESCOPE

## FACTS

Will be the premier space observatory for astronomers worldwide, extending the tantalizing discoveries of the Hubble Space Telescope.

An international collaboration among NASA, the European Space Agency, and the Canadian Space Agency.

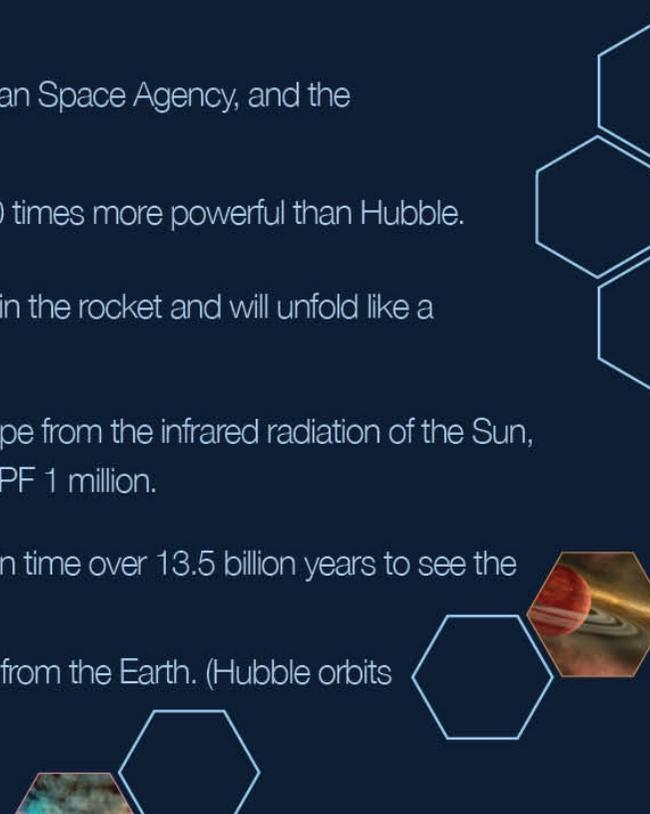
The largest telescope ever placed in space; 100 times more powerful than Hubble.

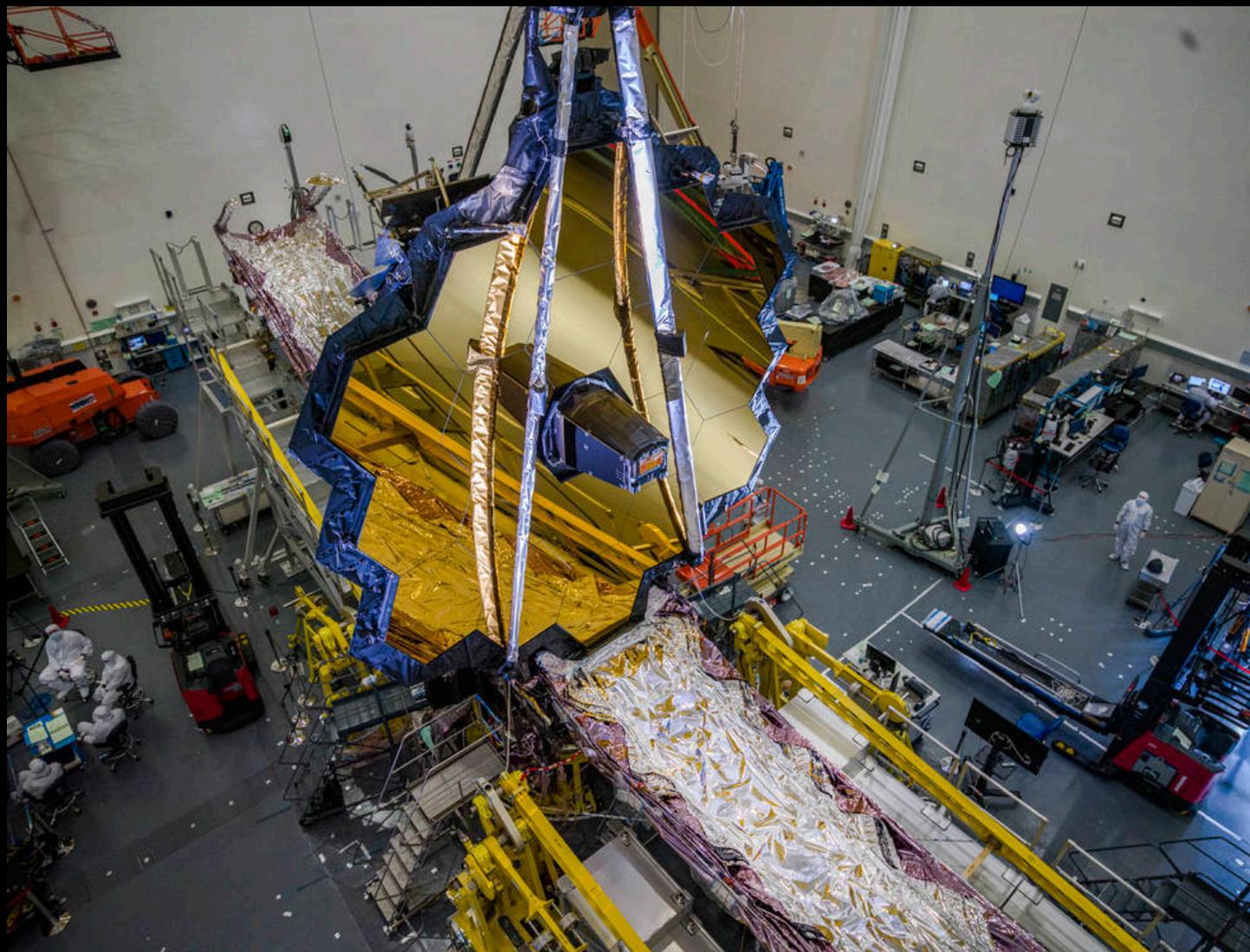
So big it has to fold origami-style to fit in the rocket and will unfold like a "Transformer" in space.

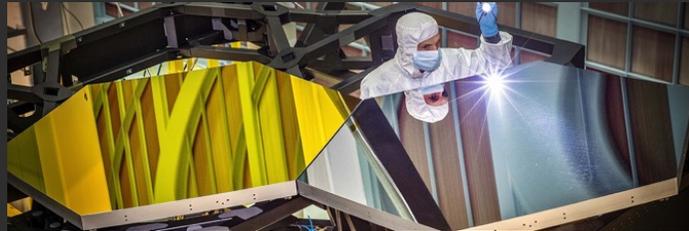
Has a 5-layer sunshield that protects the telescope from the infrared radiation of the Sun, Earth, and Moon; like having sun protection of SPF 1 million.

With unprecedented infrared sensitivity, it will peer back in time over 13.5 billion years to see the first galaxies born after the Big Bang.

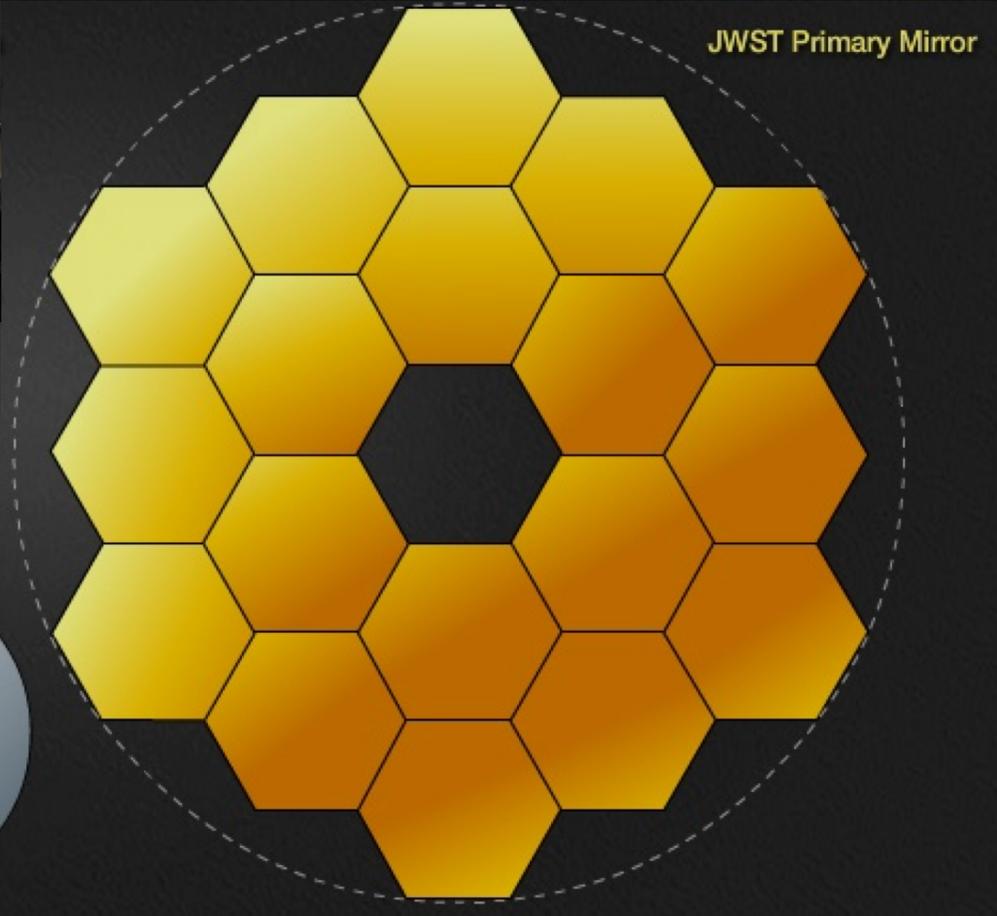
Will orbit the Sun 1.5 million kilometers or 1 million miles from the Earth. (Hubble orbits 560 kilometers above the Earth.)







JWST Primary Mirror



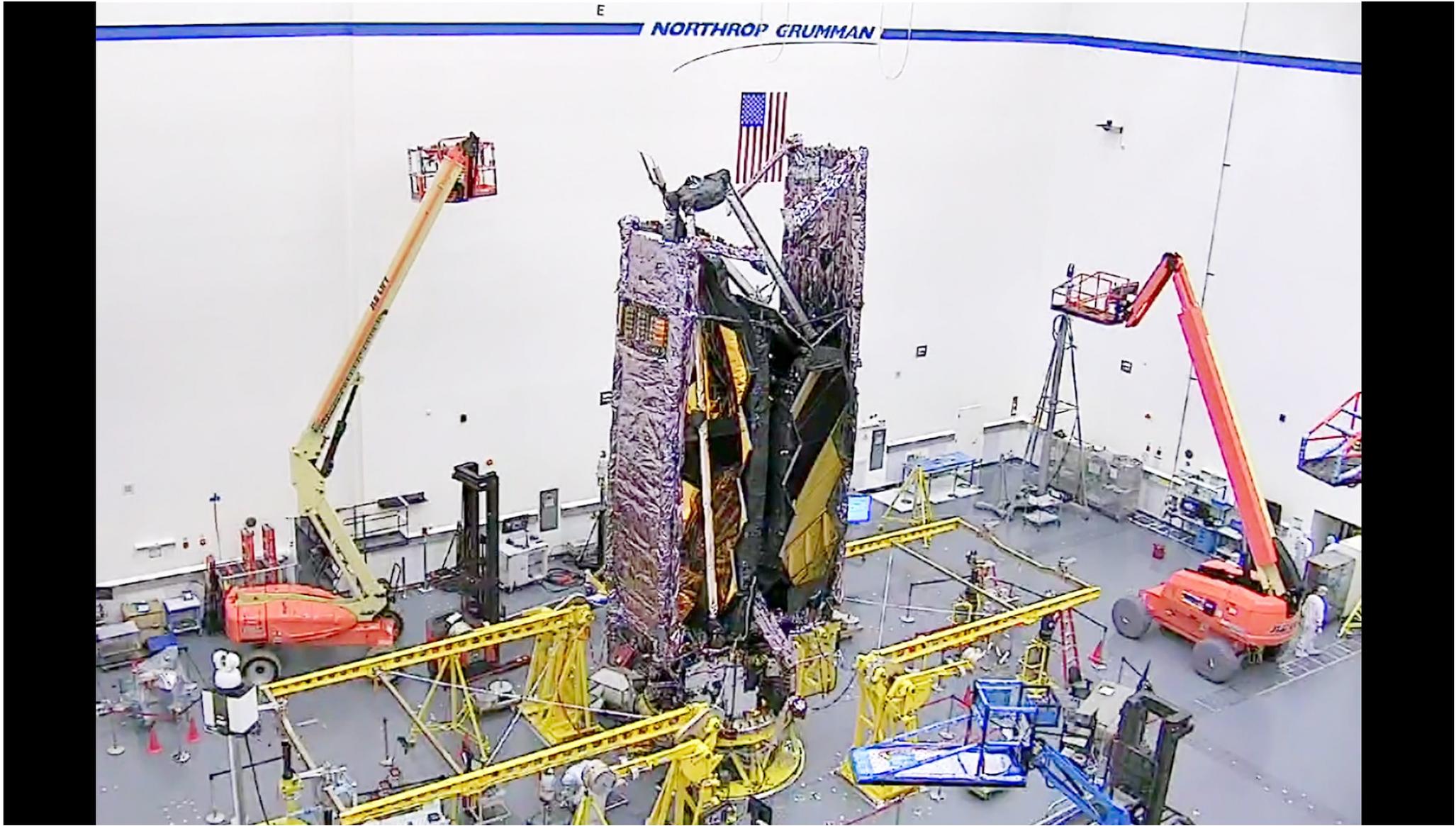
Hubble Primary Mirror





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NORTHROP GRUMMAN

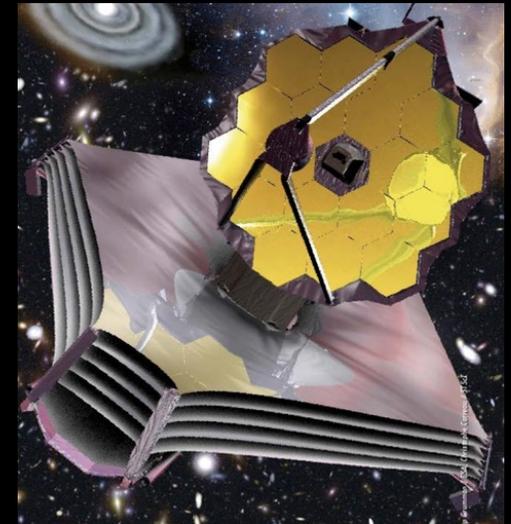




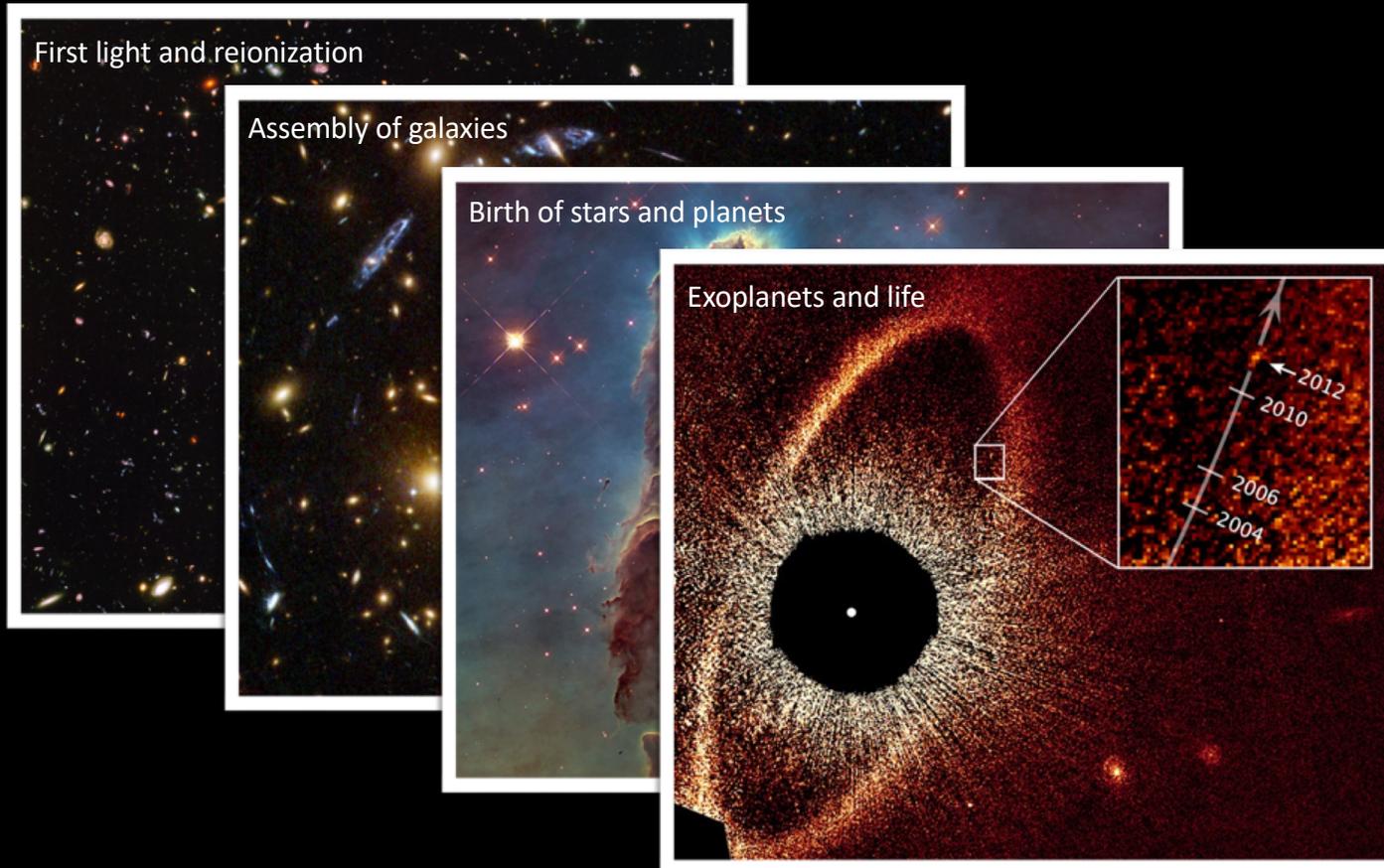
# JWST Launch/Deployment Timeline



Sun



# A new era is coming



Hubble Ultra Deep Field

Thanks!

