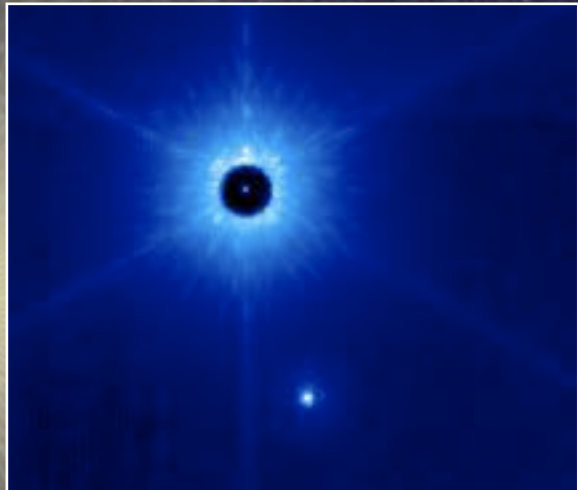
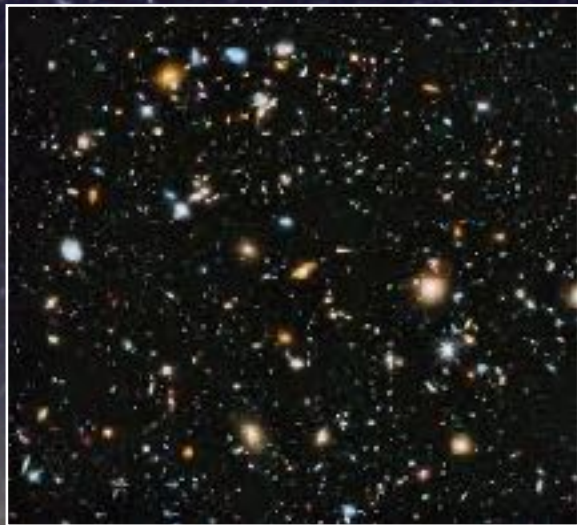




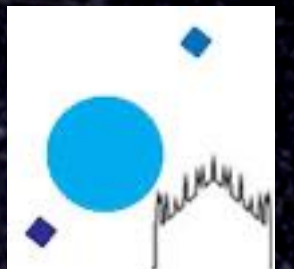
Las autoridades sanitarias advierten que el consumo por menores de edad, así como la venta y dispensación a dichos menores, de bebidas alcohólicas, están prohibidos e informan que dicho consumo puede provocar graves riesgos y daños a su salud y seguridad.

Vesmírný dalekohled Jamese Webba

Martin Topinka



INAF
IASF - Milano

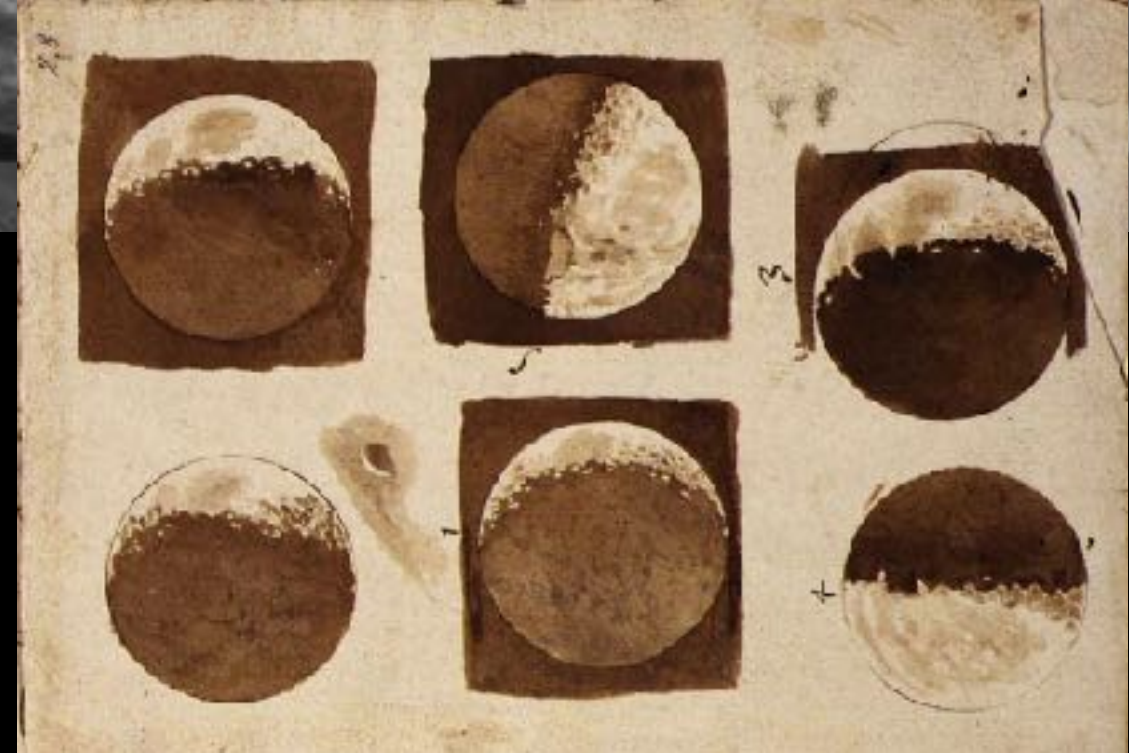


17. 5. 2022, U3V Brno

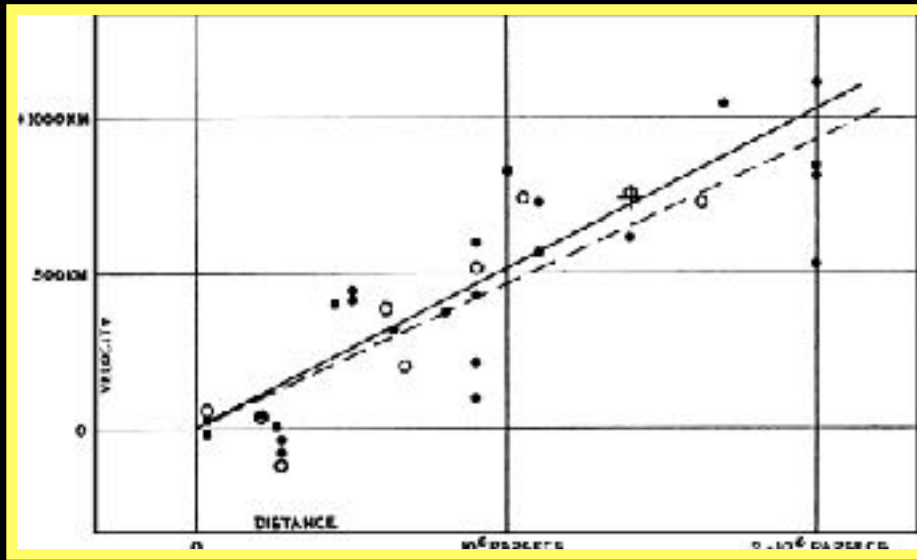


Observationes Jovis
1610

20. Janis	● ● ●
30. Janis	● ● ● *
2. Febr.	● ● ● *
3. Mart.	● ● ●
3. Apr. 5.	* ● *
7. Mart.	* ● ● *
6. Mart.	● ● ● *
8. Mart. H. 17.	* ● ● ●
10. Mart.	* * ● ● *
11.	* * ● *
12. H. 4. 17. 17.	* ● *
17. Mart.	* ● ● *
14. Junii.	* * ● *



Hubble Space Telescope

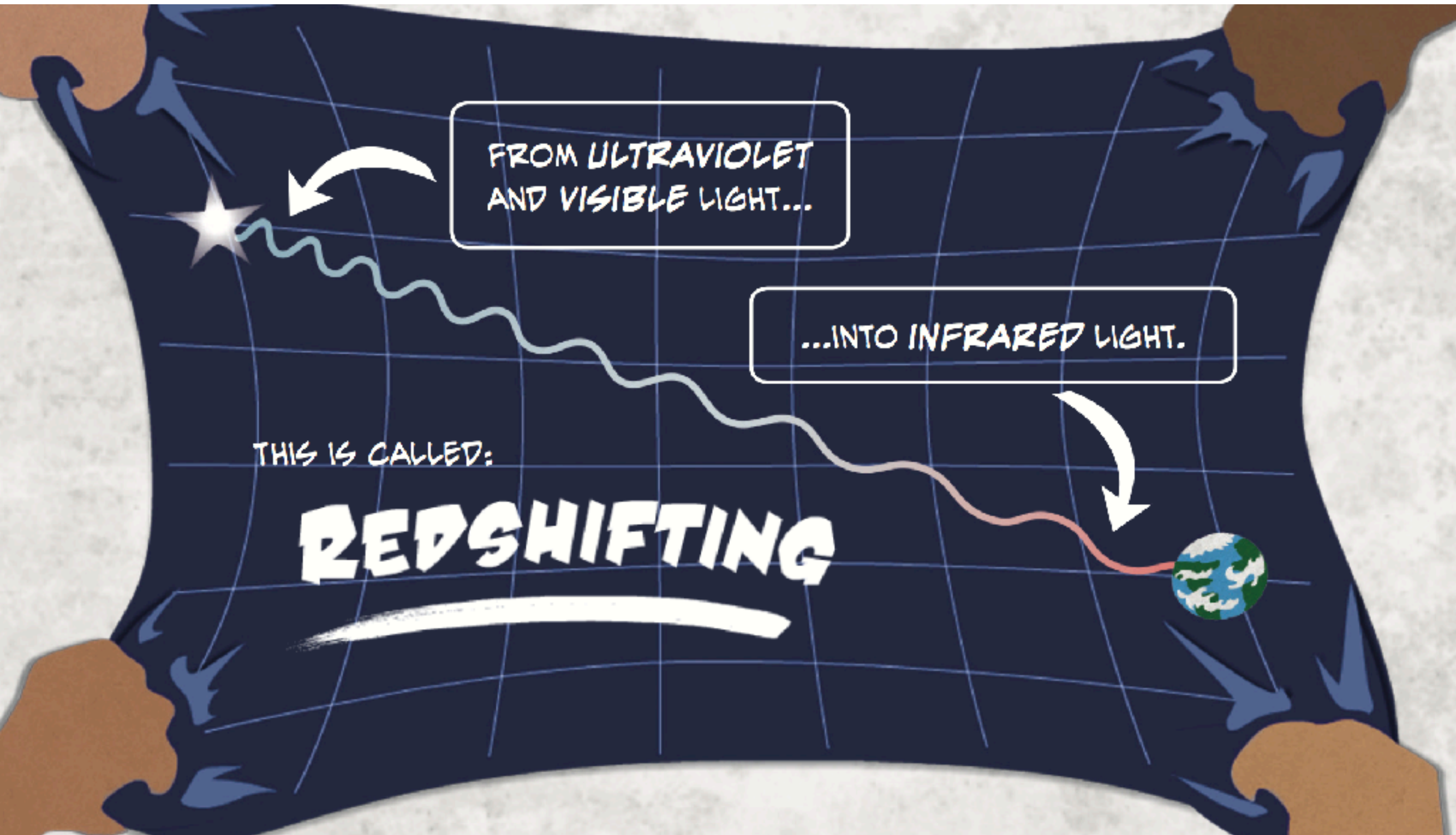


Hubble Ultra Deep Field

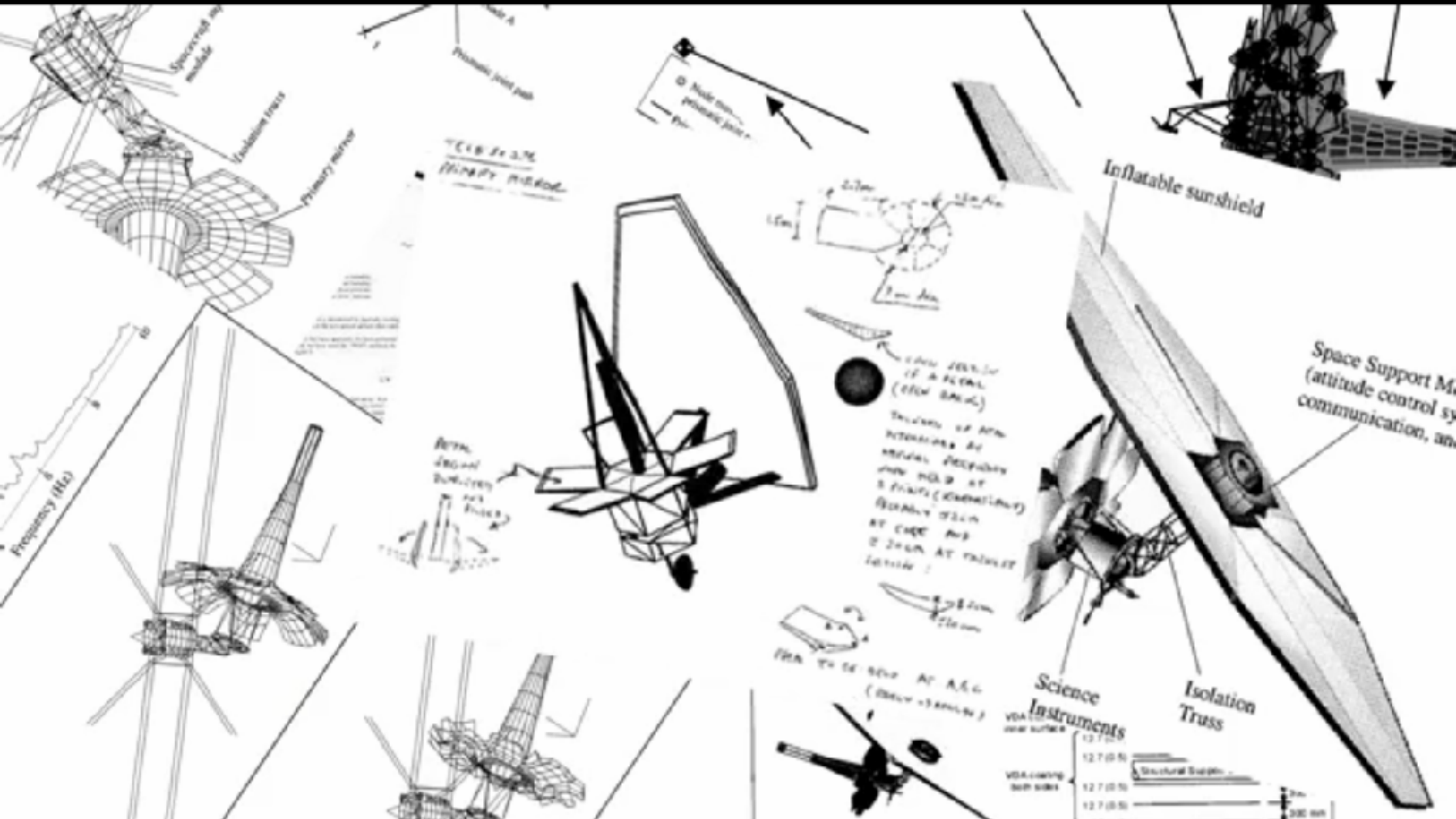


Robert Williams

Kosmologický červený posuv



Next Generation Space Telescope



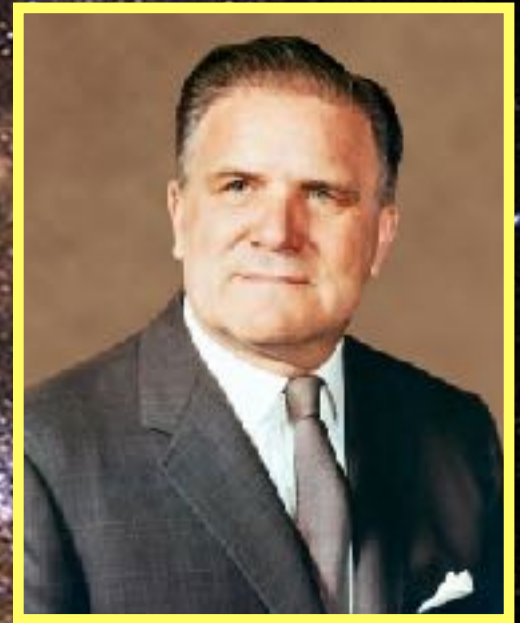


15% pozorovacího času

**Northrop Grumman
Space Technology**



James Webb Space Telescope



primární zrcadlo
18 segmentů
průměr 6.5m

infra-červený dalekohled

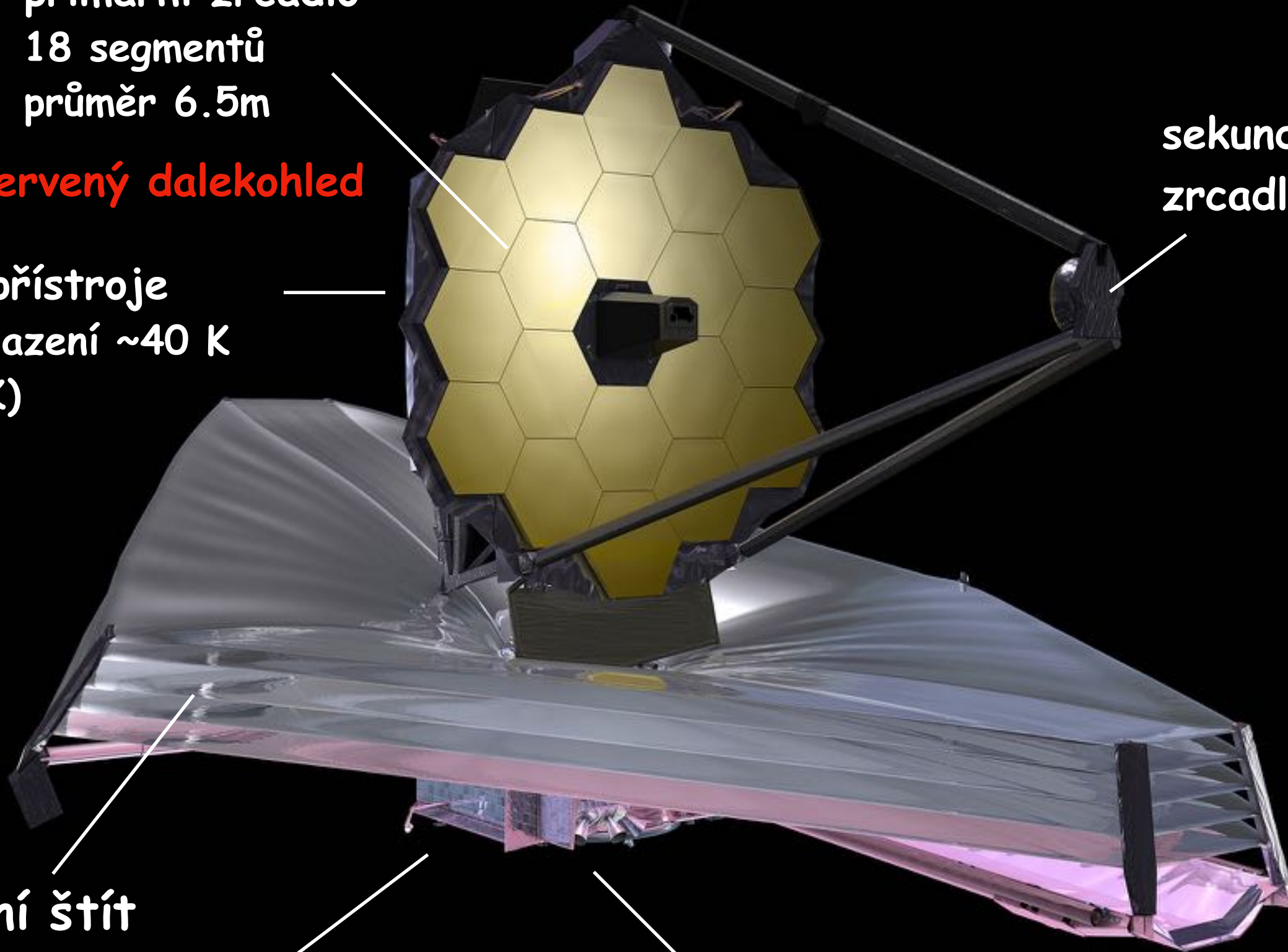
vědecké přístroje
pasivní chlazení ~40 K
(MIRI 7 K)

sekundární
zrcadlo

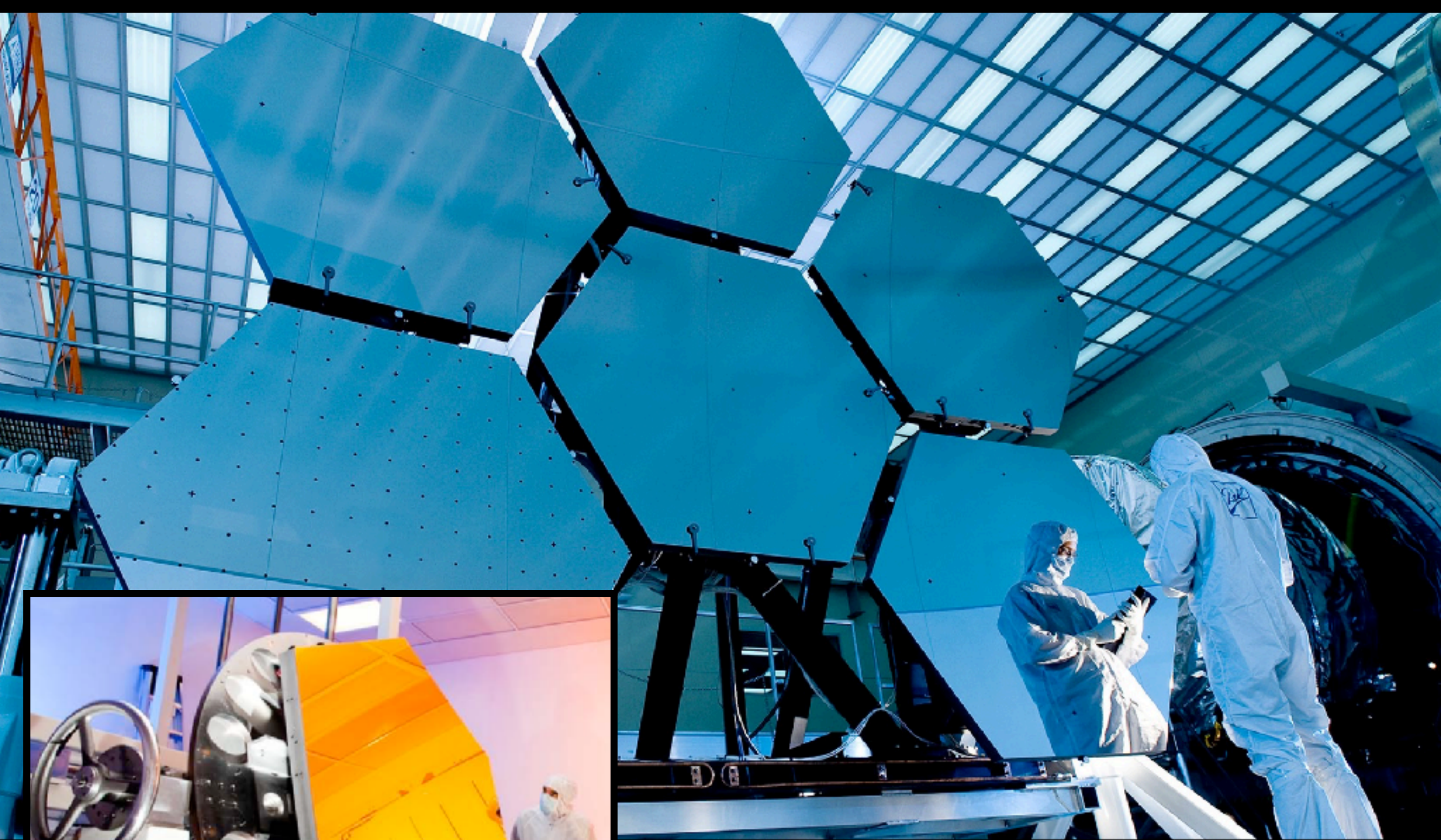
sluneční štít

další přístroje
satelitu

naváděcí kamera
(star-tracker)







Ten reasons why NASA's James Webb Space Telescope will kick some cosmic butt

by Jonathan O'Callaghan, 9 July 2013

The James Webb Space Telescope Will Truly Do What Hubble Only Dreamed Of



Starts With A Bang

The Universe is out there, waiting for you to discover it [FULL BIO](#) ✓

Opinions expressed by Forbes Contributors are their own.

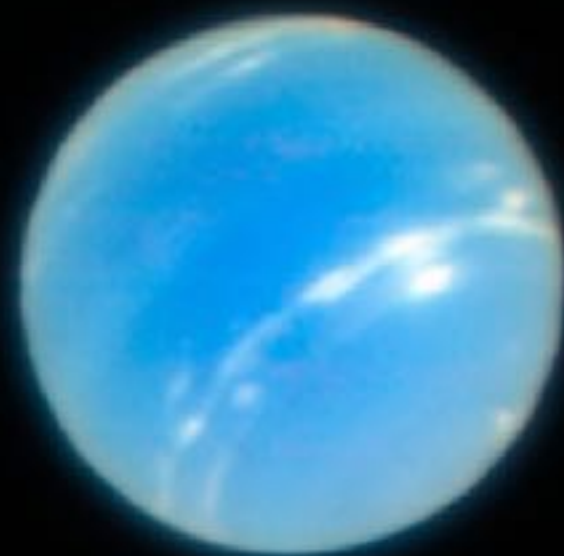
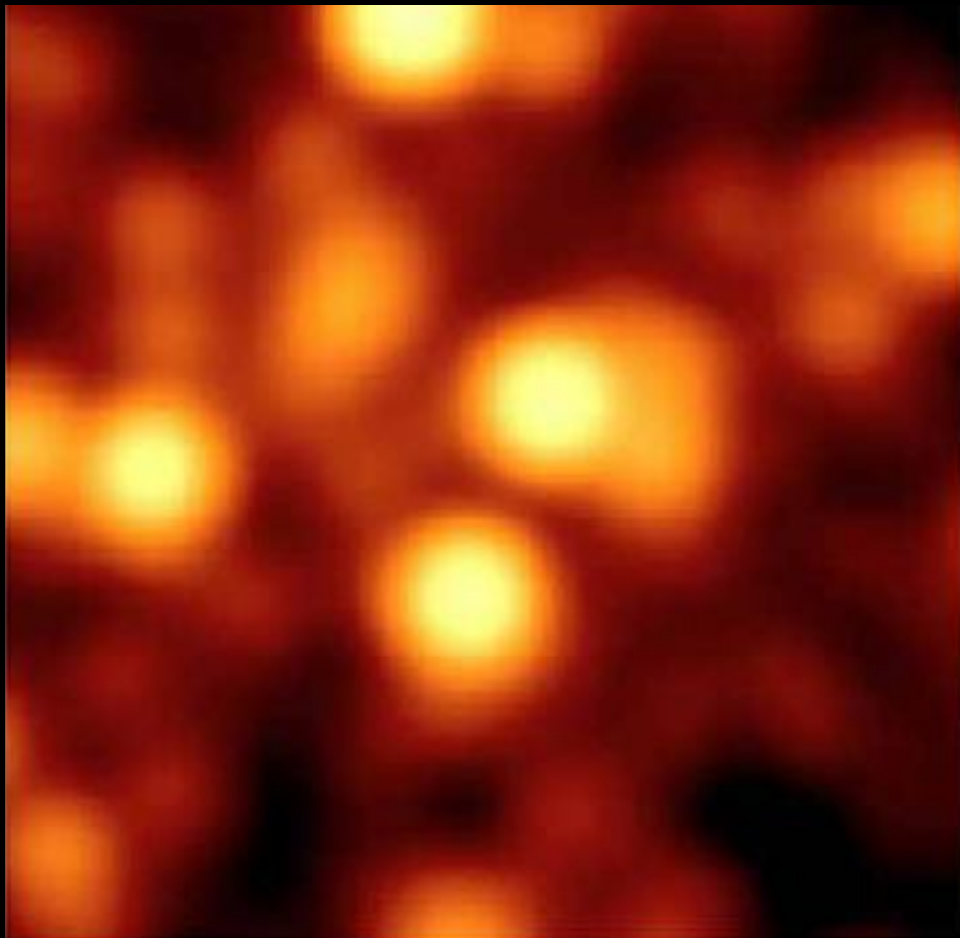


Ethan Siegel, Contributor

How will James Webb telescope outshine Hubble?

To be launched in 2018, the James Webb will be the most powerful telescope in history, able to see back into the earliest days of the universe.





GAMMA

X-RAY

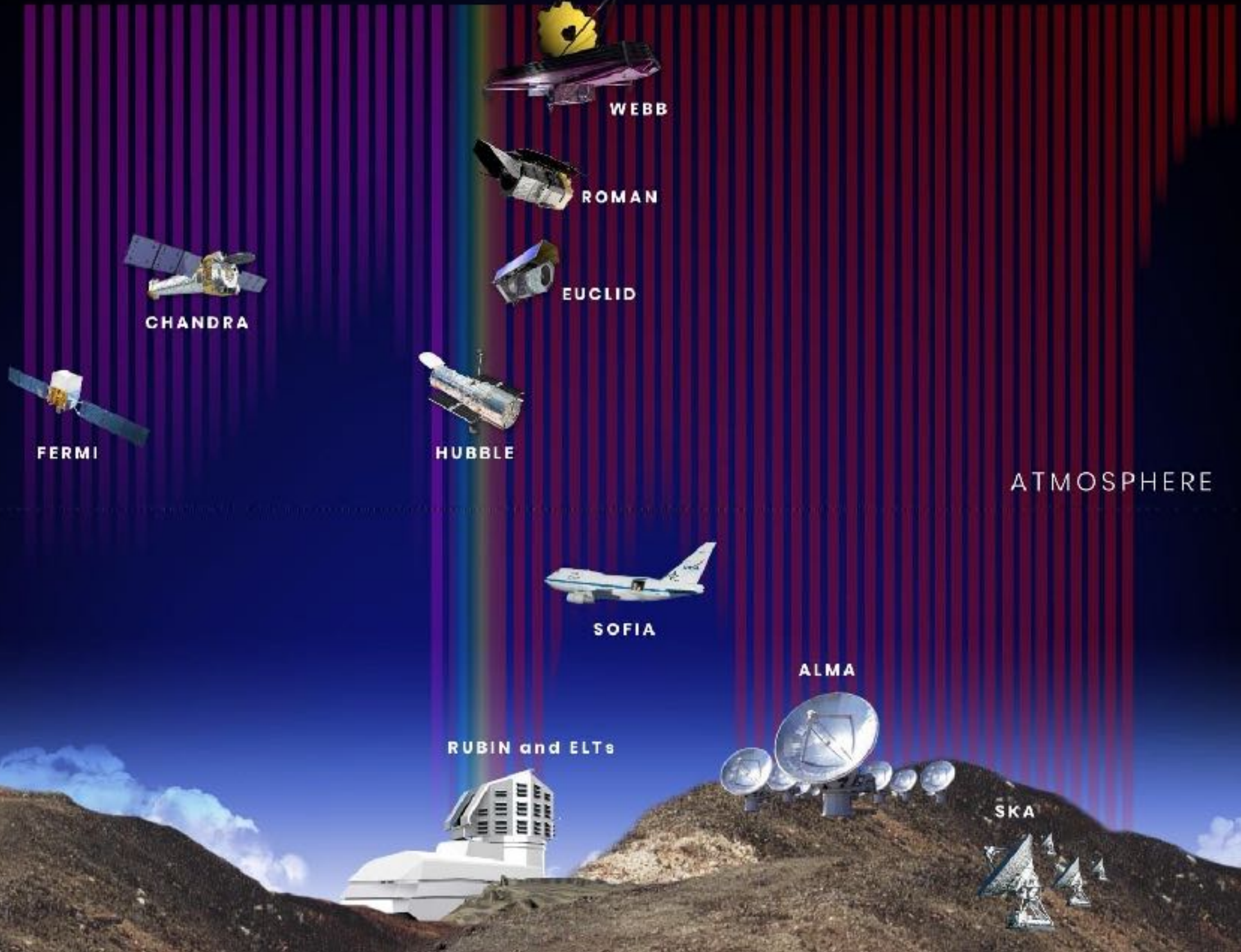
ULTRAVIOLET

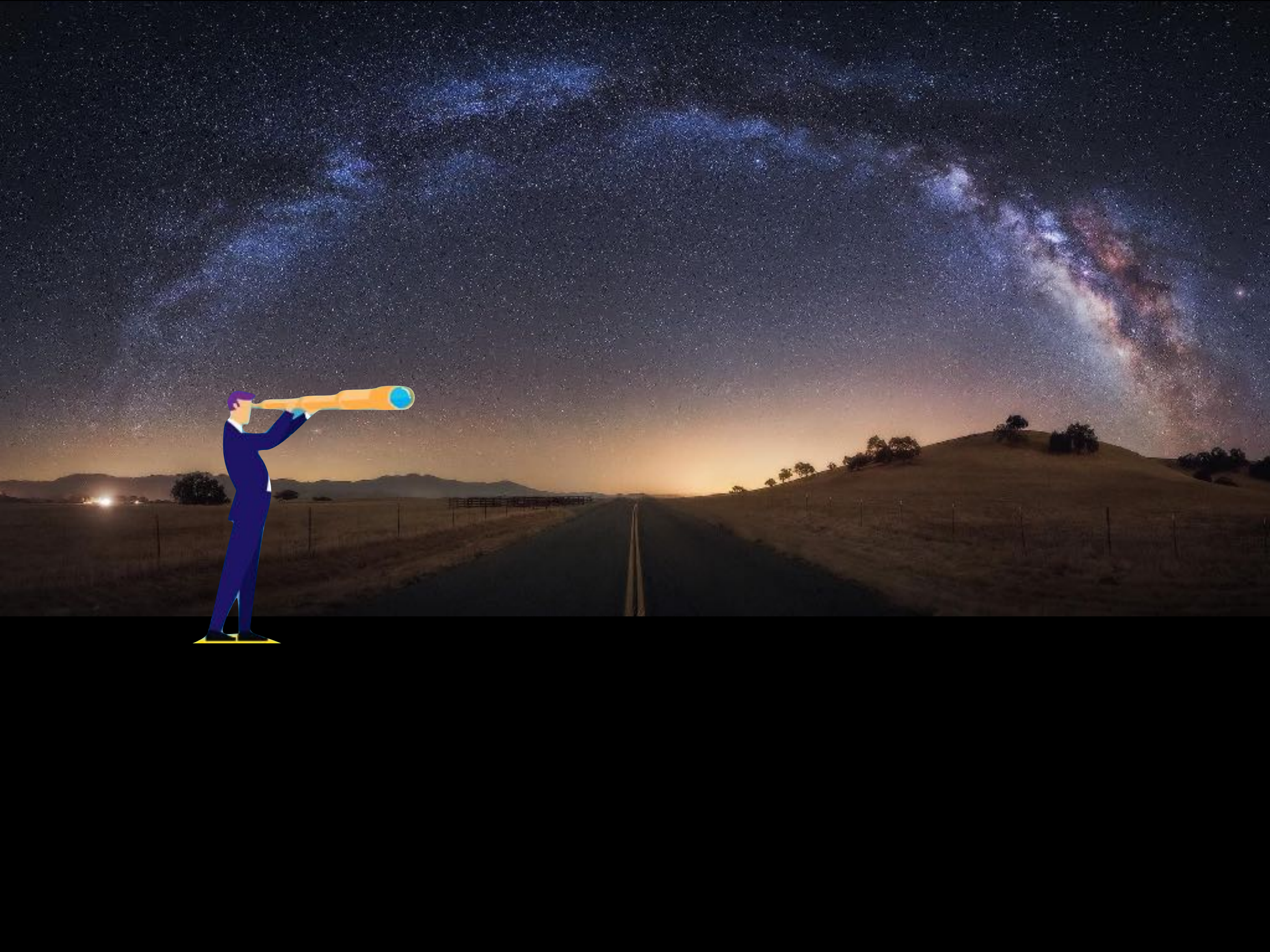
VISIBLE

INFRARED

MICROWAVE

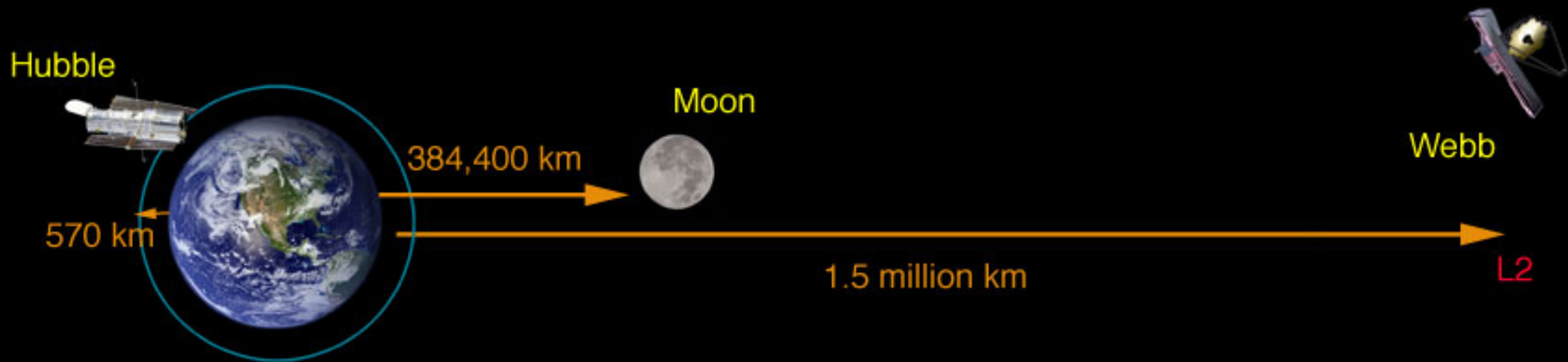
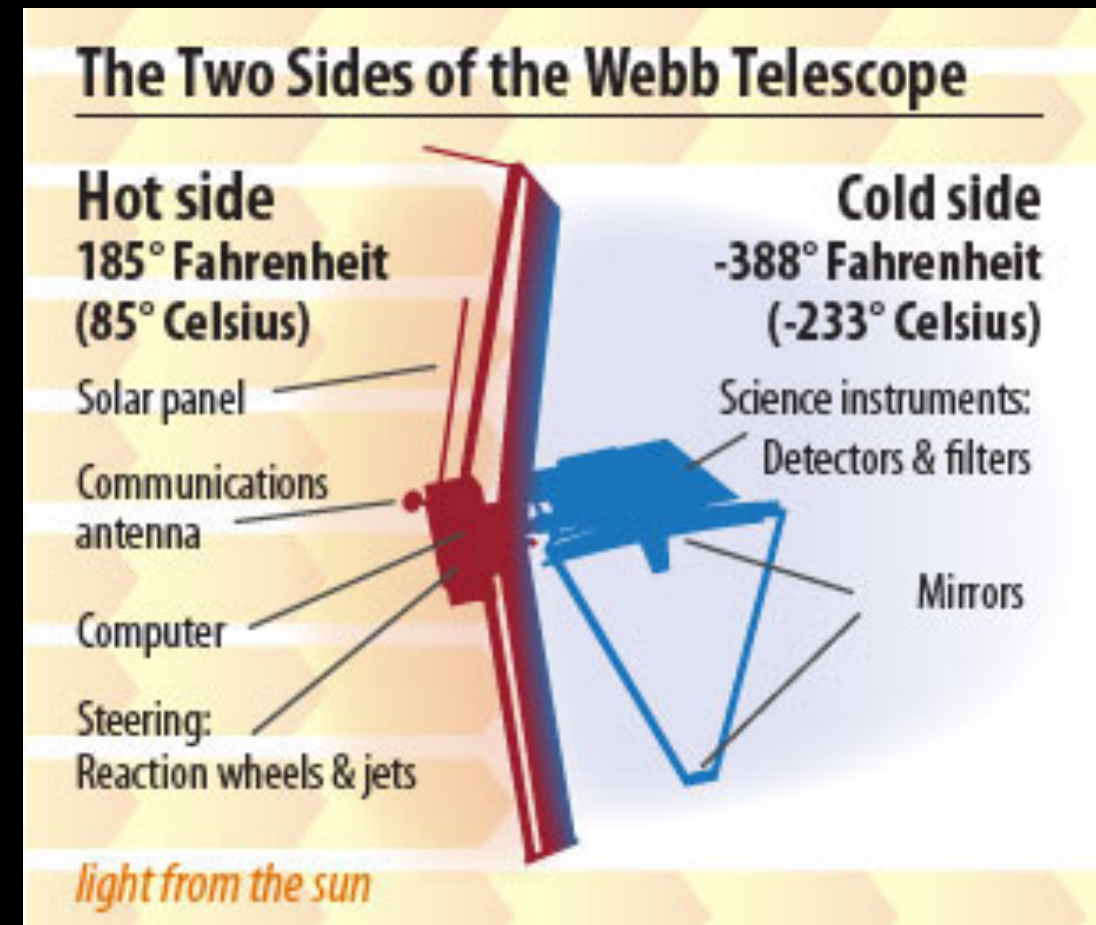
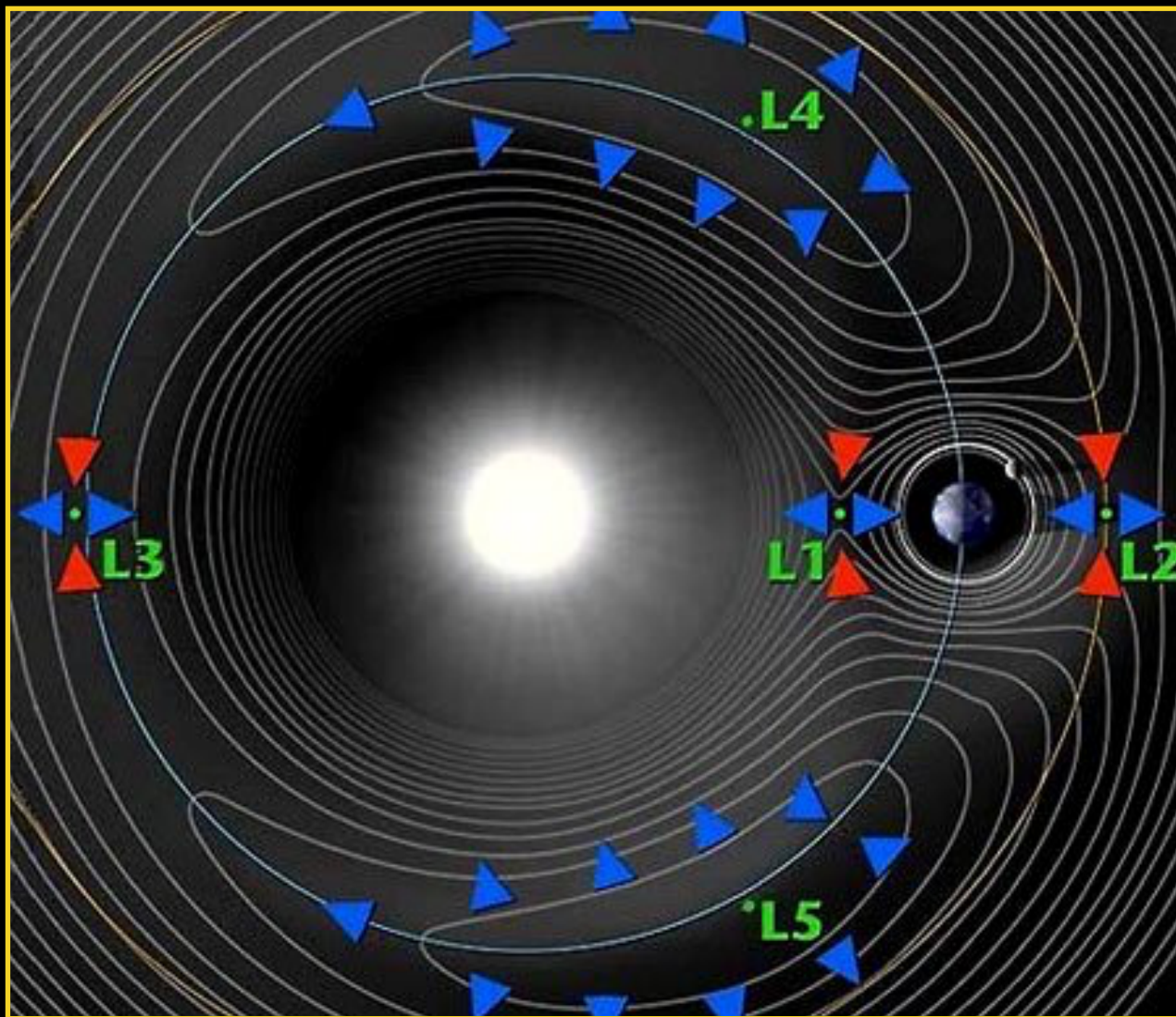
RADIO

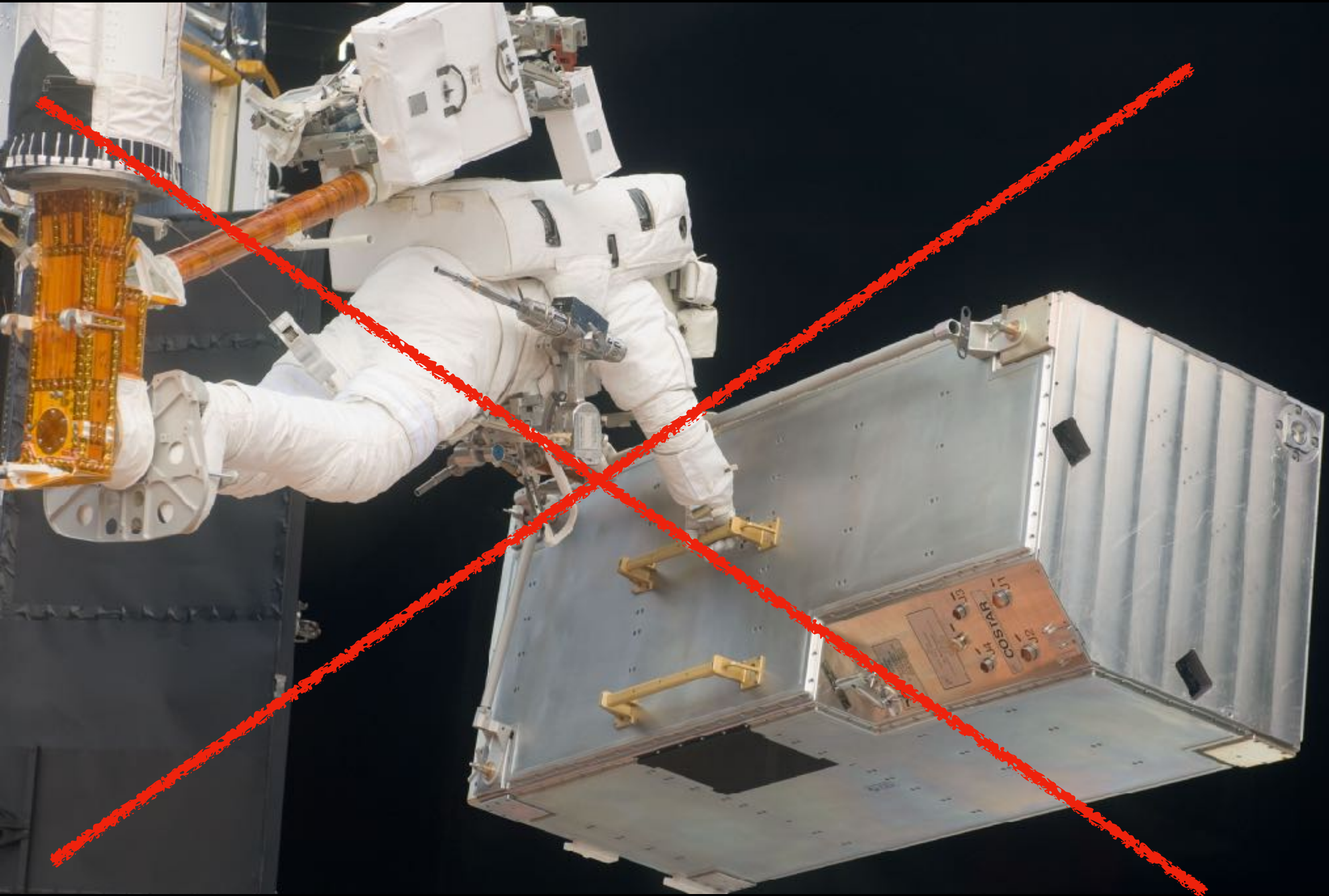




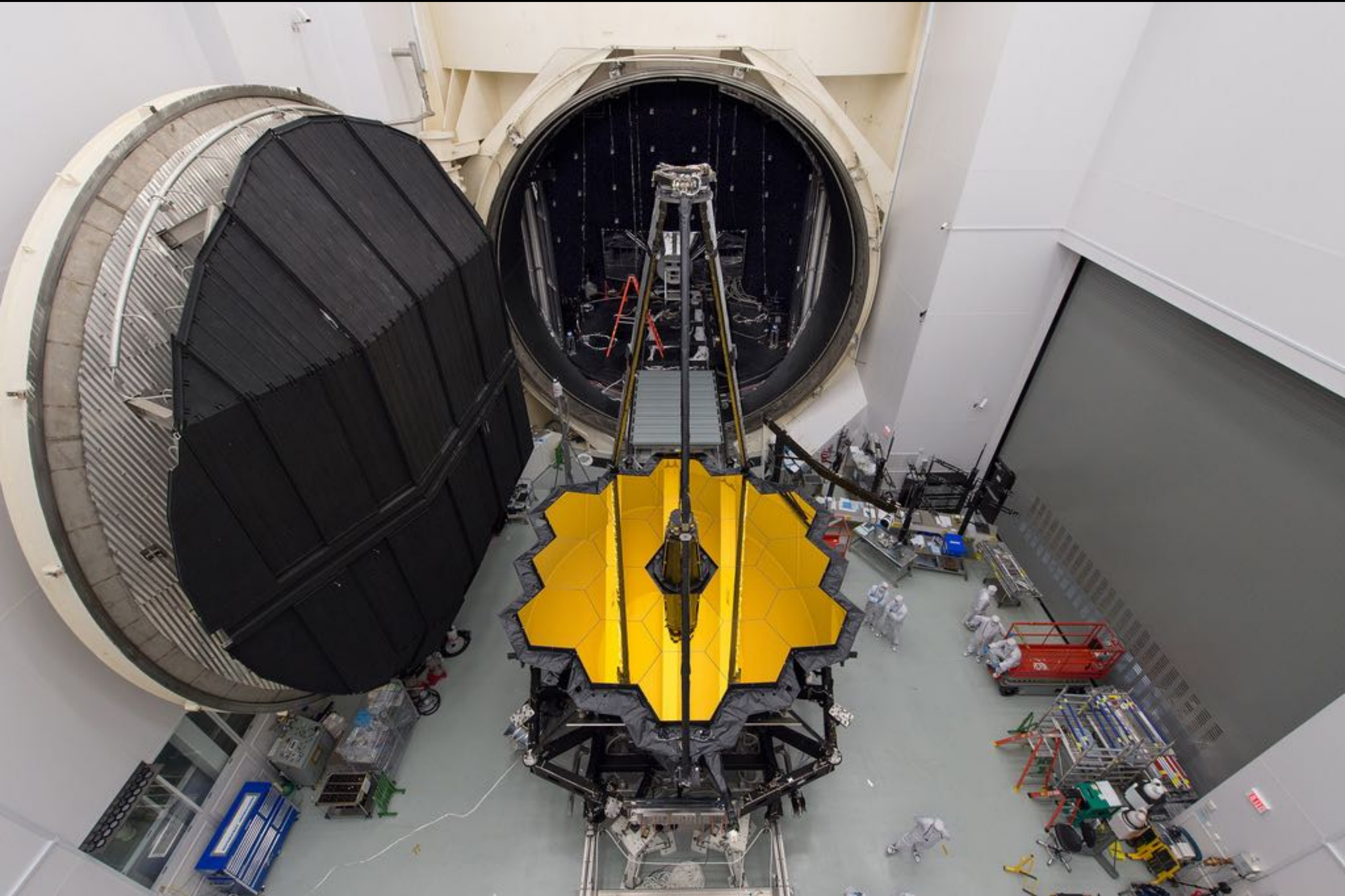












~~Jaro 2019~~ ~~Květen 2020~~ ~~Březen 2021~~ Říjen 2021

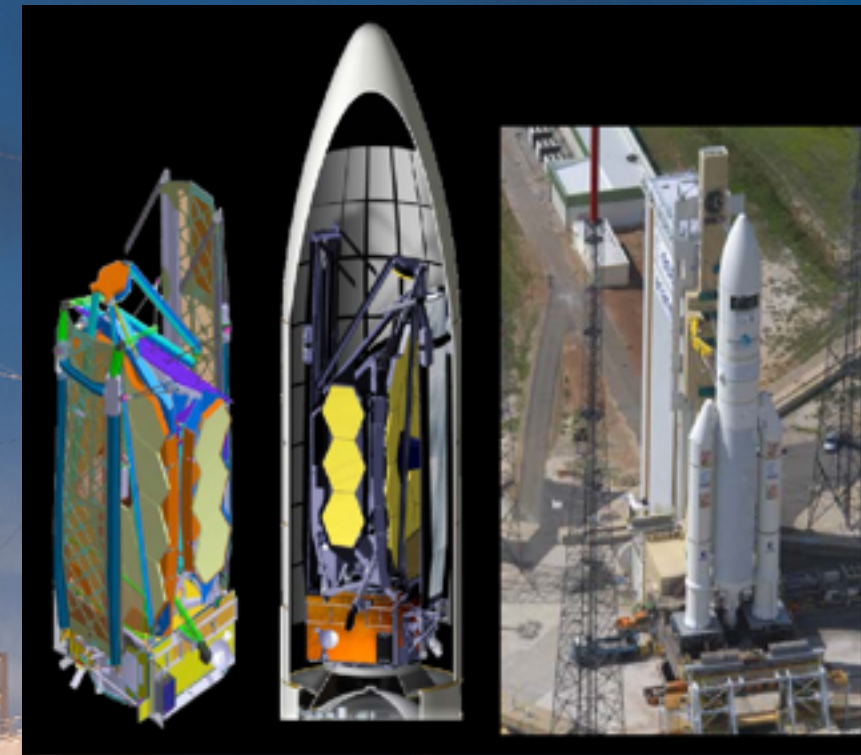
Očekávaný start: ~~Říjen 2018~~ z Francouzské Guiany

Životnost mise 5-10+ let

Je třeba více času
na testování
slunečního štítu!

JWST suffers new problem during spacecraft testing

by Jeff Foust — May 3, 2018



Plánovaný start a cena

Rok	Start	Budget (miliardy USD)
1997	2007	0,5
1998	2007	1
1999	2007 to 2008	1
2000	2009	1,8
2002	2010	2,5
2003	2011	2,5
2005	2013	3
2006	2014	4,5
2008	2014	5,1
2010	2015 to 2016	6,5
2011	2018	8,7
2013	2018	8,8
2017	2019	8,8
2018	2020	≥8.8

Why NASA's James Webb Space Telescope is such a fiscal black hole

BY MARK WHITTINGTON, OPINION CONTRIBUTOR — 04/12/18 04:30 PM EDT

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL



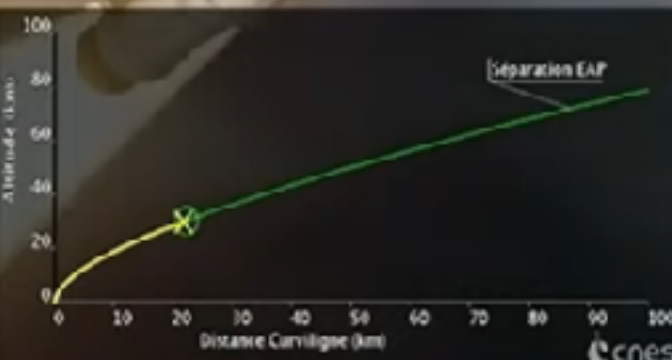


1. svátek vánoční 2021

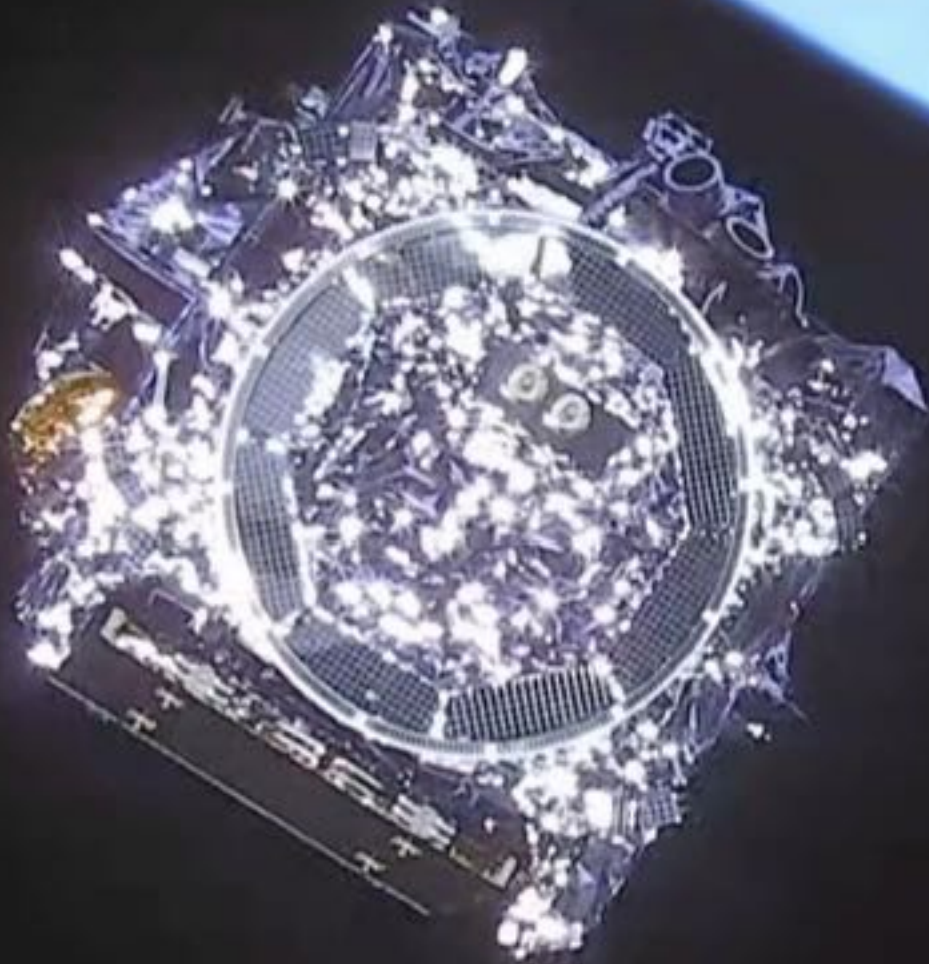
+00:01:36



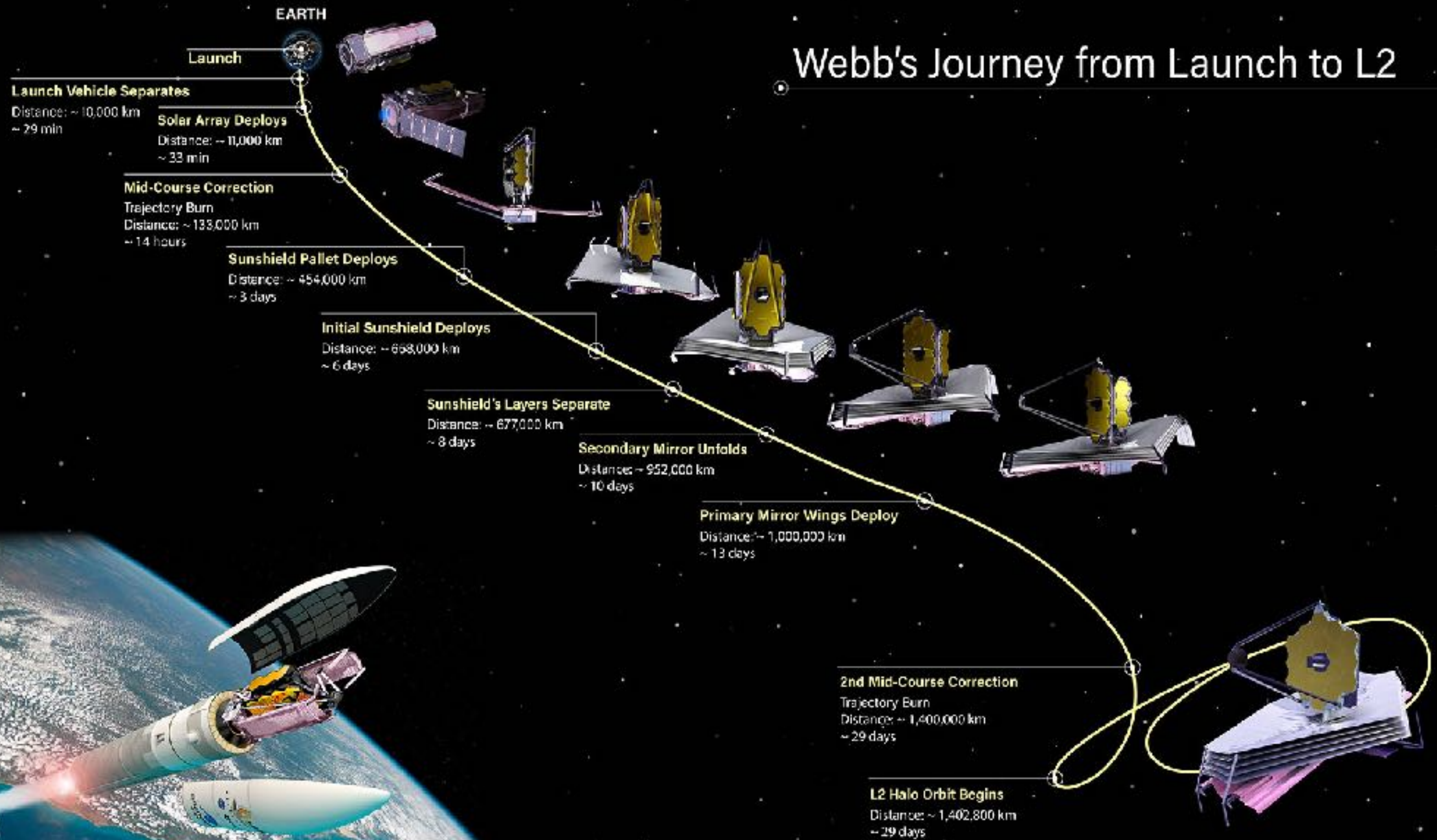
Altitude 29 km
Distance 21 km
Vitesse 1,11 km/s







Webb's Journey from Launch to L2

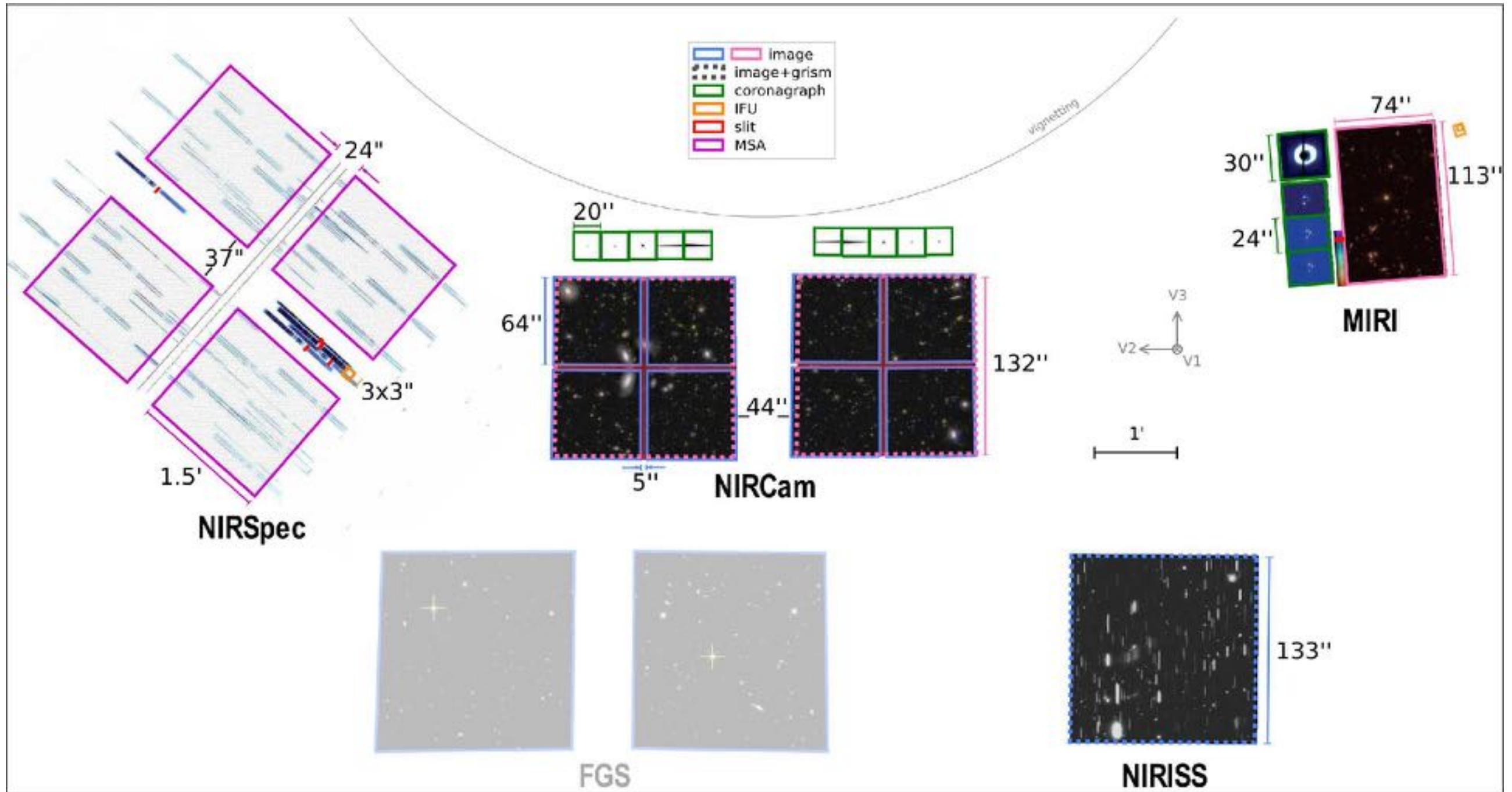


Webb on the Ariane 5 Rocket credit: ESA

Graphic credit: AURA

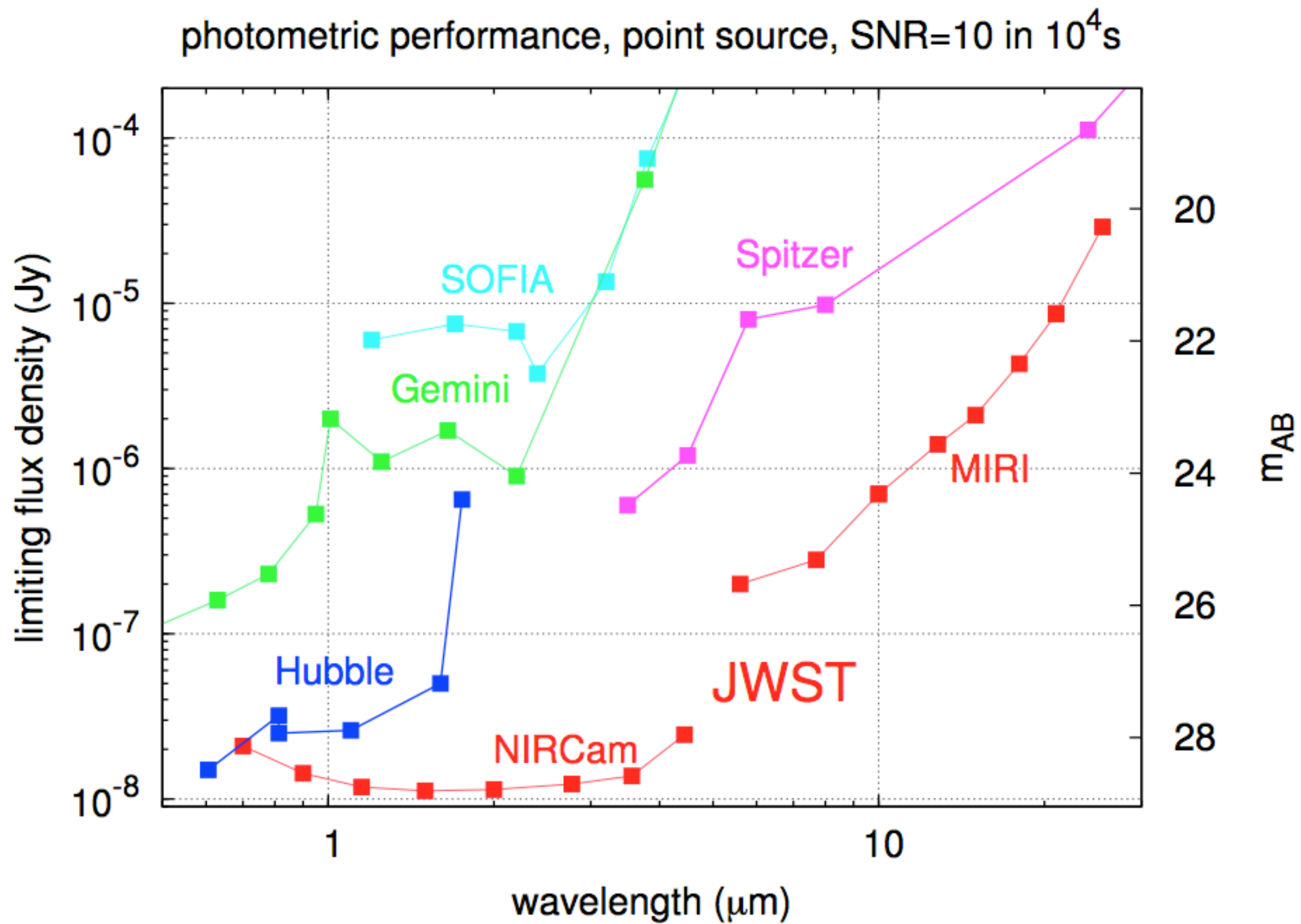
Webb images: NASA Goddard Space Flight Center

Vědecké přístroje na JWST

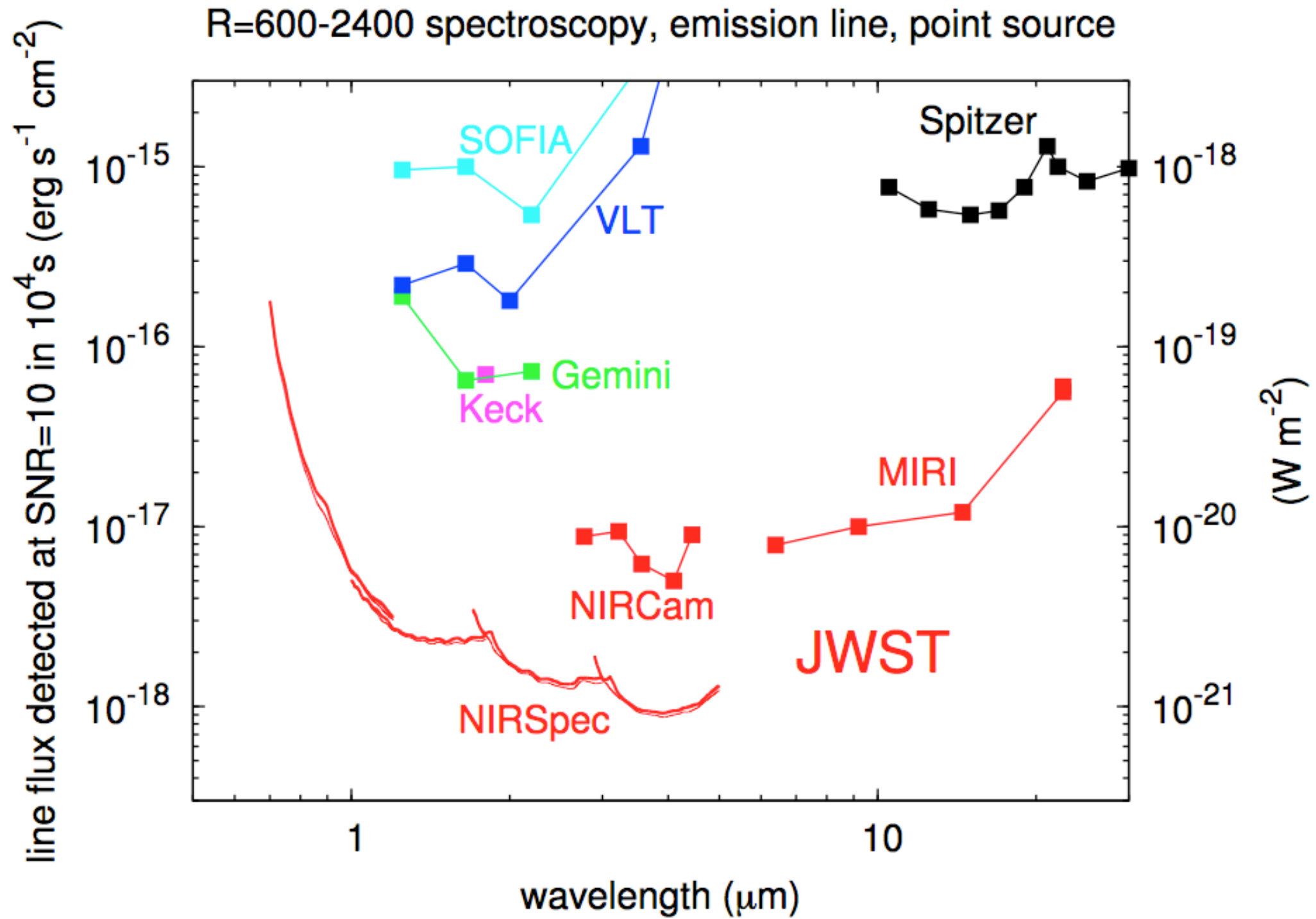


	Classical Imaging	High Contrast Imaging	Spectroscopy	
NIRCam	FoV: 4x2.2'x2.2' 27 bands, λ : 0.6-5 μ m pixel size 0.032", 0.065"	5 Coronagraphic Masks and 2 Pupils for each arm	Slitless, R~2000, λ : 2.4-5 μ m	0.6-5 μ m
NIRSpec			- 5 Fixed slits, one large - Multi-Object Spectroscopy - IFU λ : 0.6-5 μ m, R~100, 1000, 2700	
NIRISS	FoV: 2.2'x2.2' 7 bands, λ : 0.9-5 μ m pixel size 0.065"	Aperture Masking Interferometry λ : 3.8-4.8 μ m	- Slitless Wide-field R~150, λ : 1-2.5 μ m - Slitless Single-Object R~700, λ : 0.6-2.5 μ m	5-28 μ m
MIRI	FoV: 1.25'x1.88' 9 bands, λ : 5-27.5 μ m pixel size 0.1"	4 Coronagraphs, λ : 10.6-23 μ m (3 4QPM, 1 Lyot)	- Slitless/Slit, R~100, λ : 5-12 μ m - IFU, R~3000, λ : 5.0-28 μ m	

Citlivost JWST

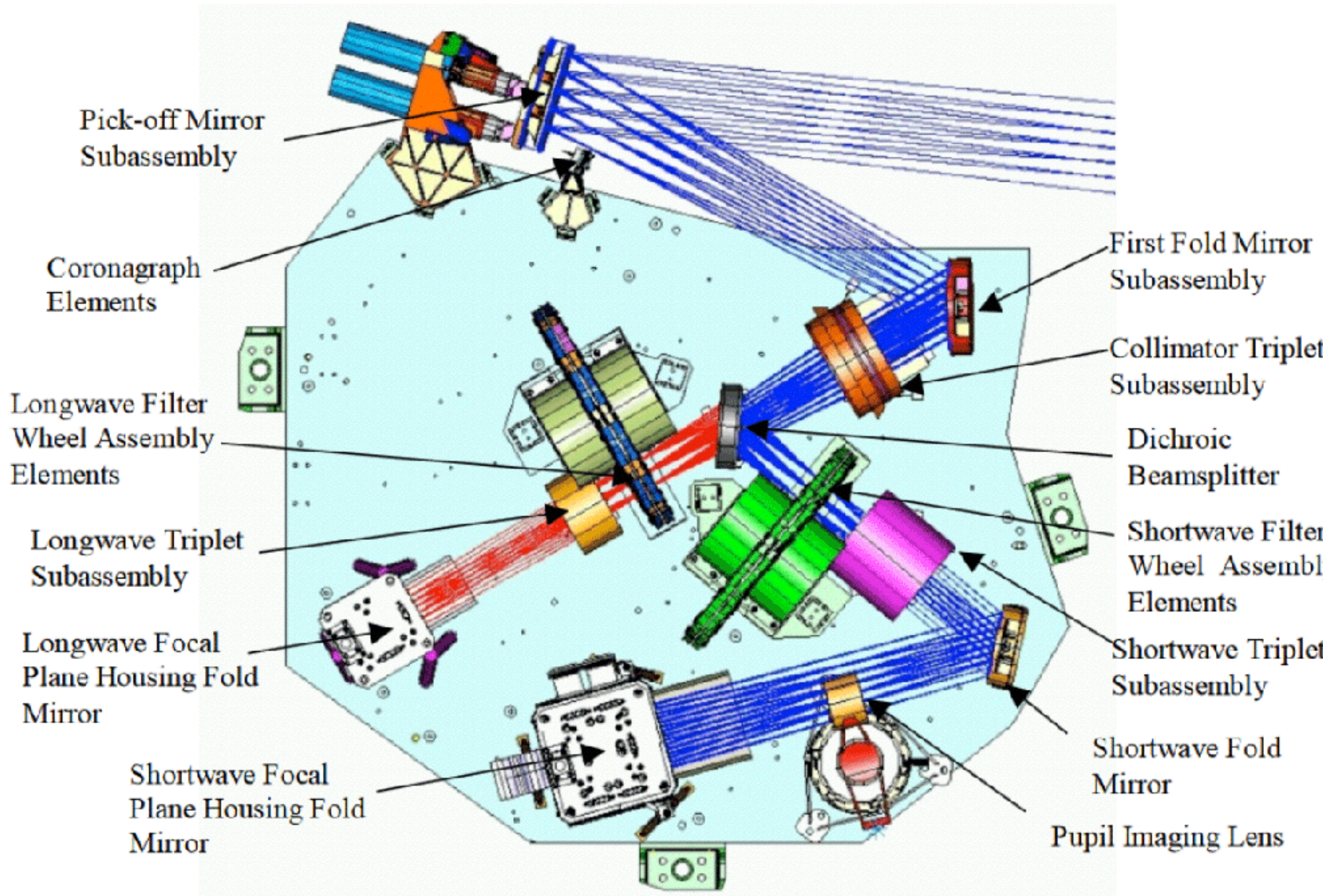


Citlivost JWST

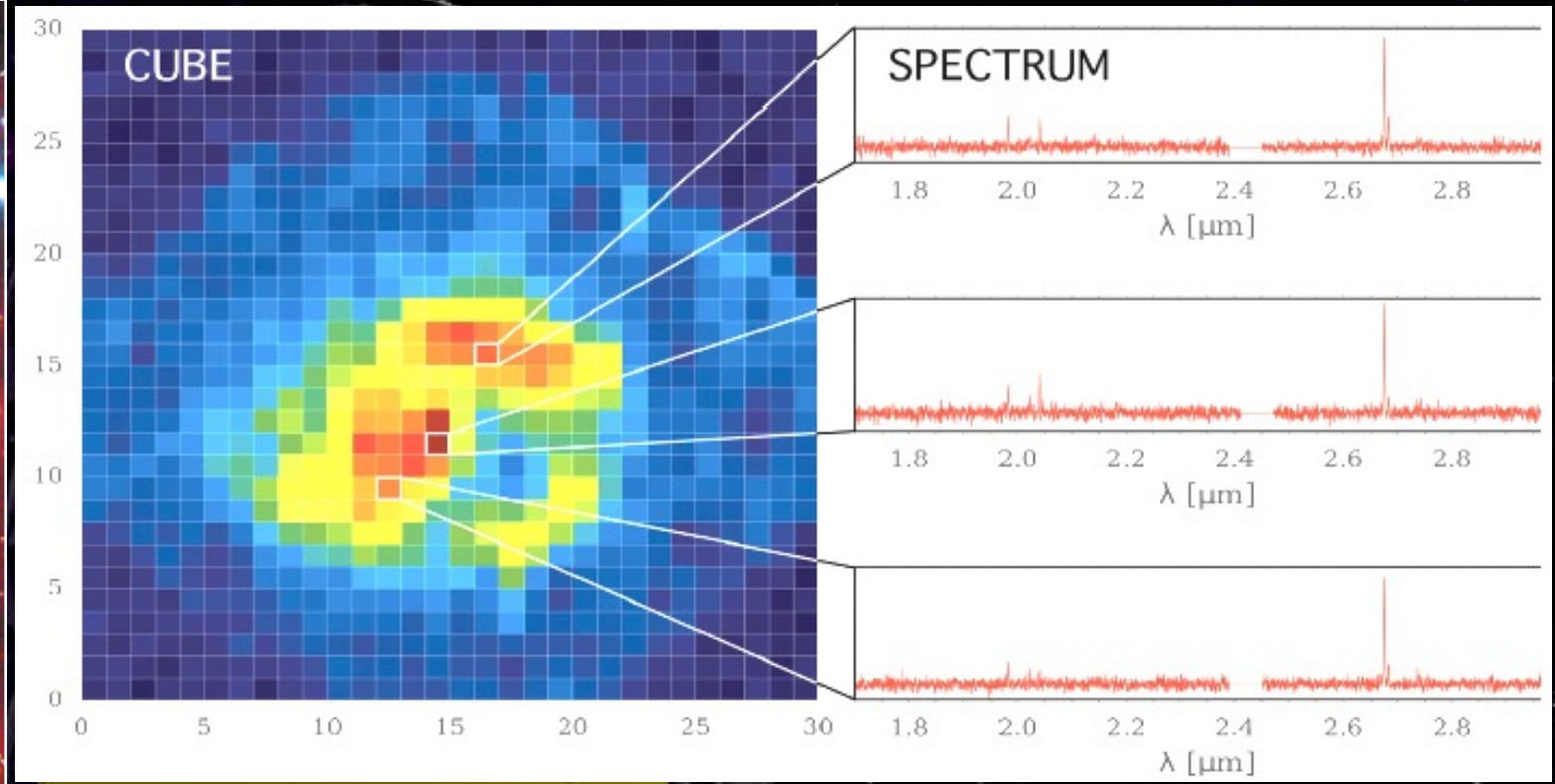
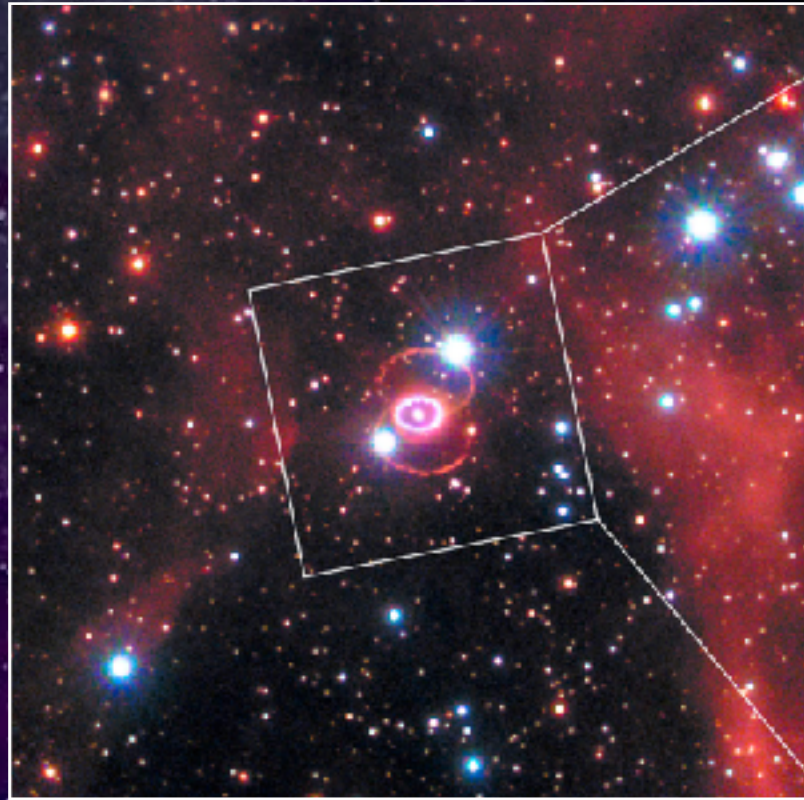




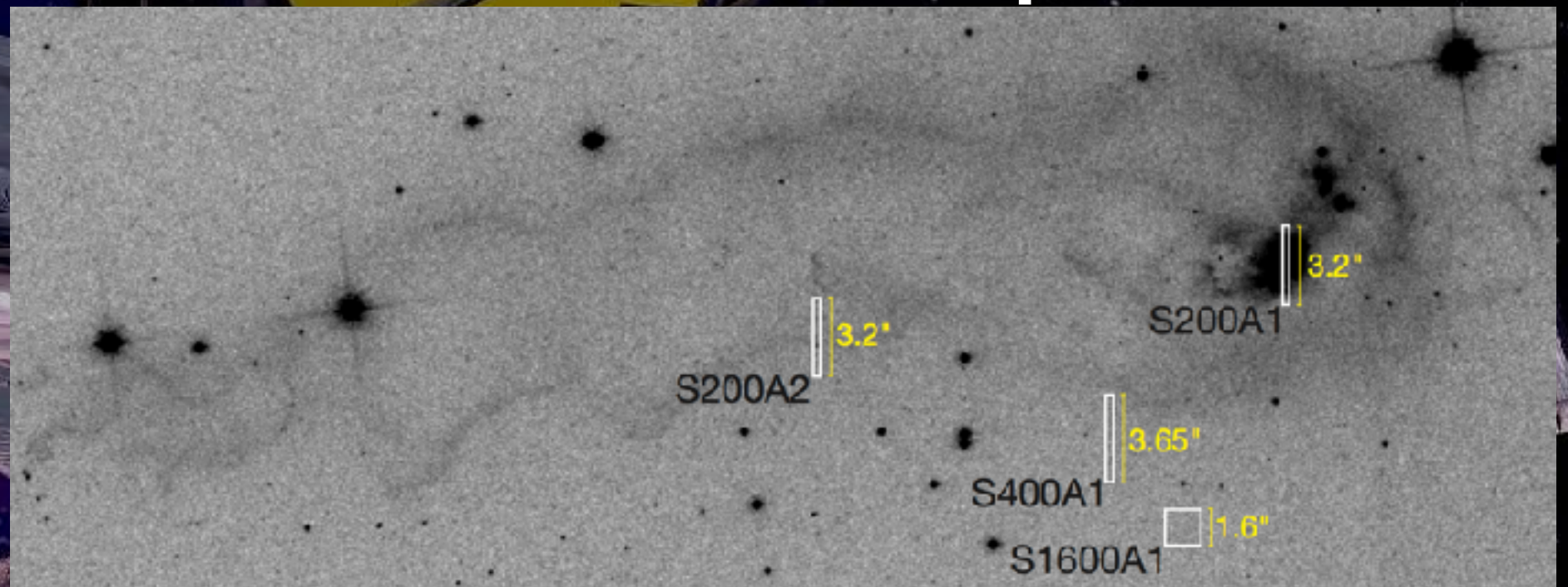
0.1 arc sec $\delta\theta = 1.22 \lambda/D$



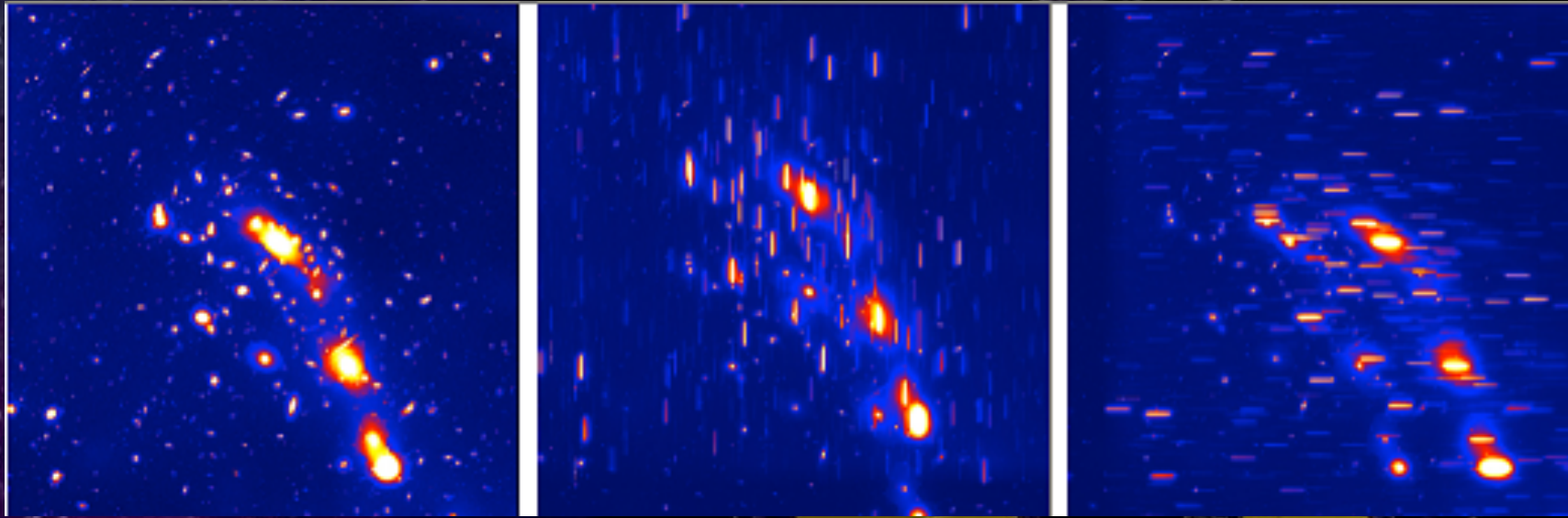
NIRSpec IFU (Integrated Field Unit)



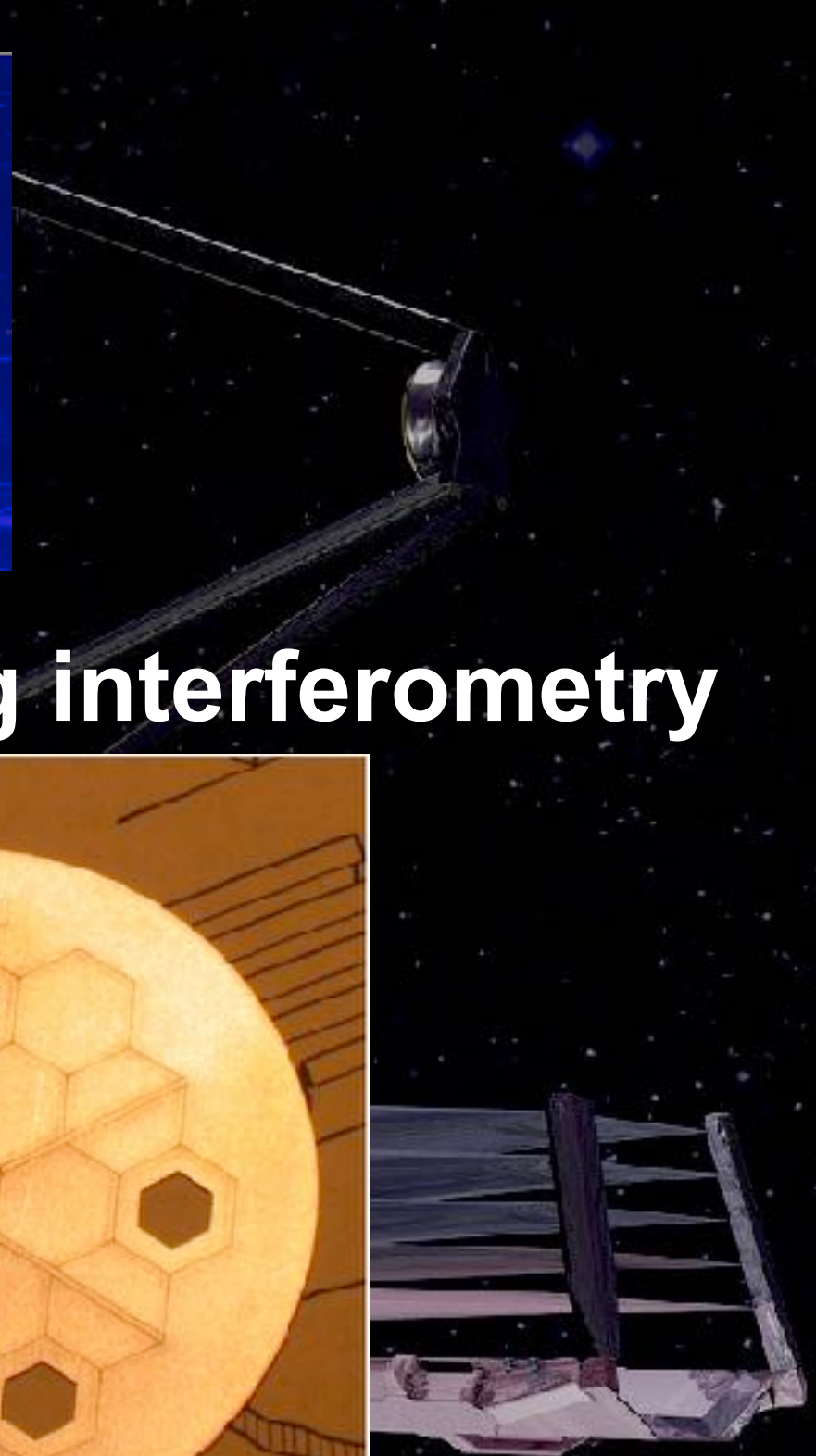
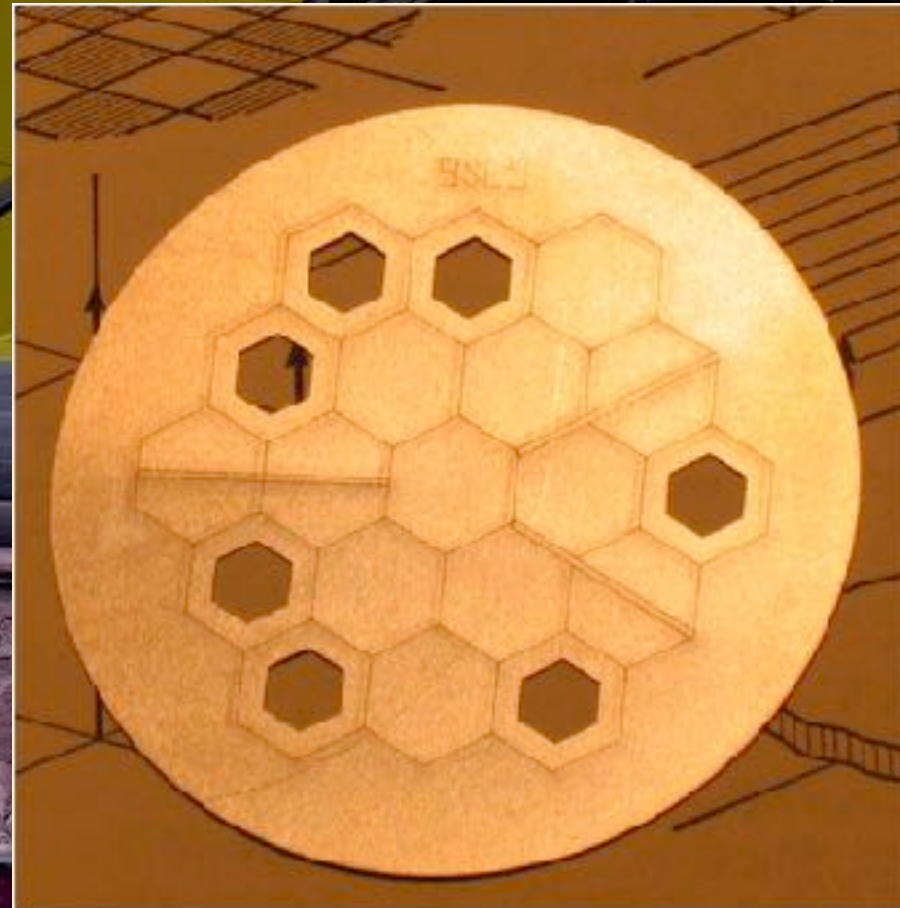
NIRSpec fixed slit



NIRISS (Slitless)



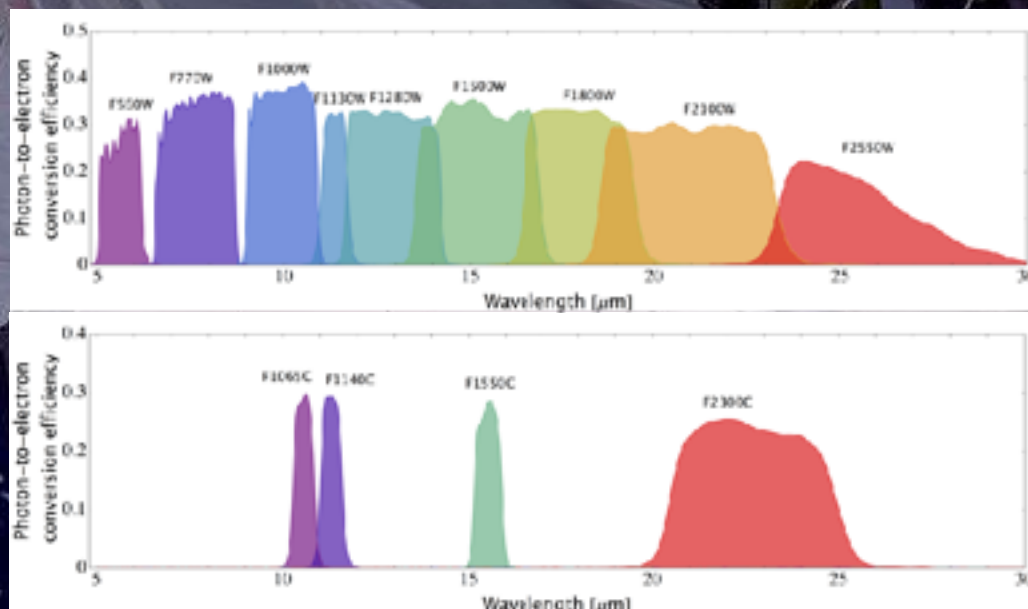
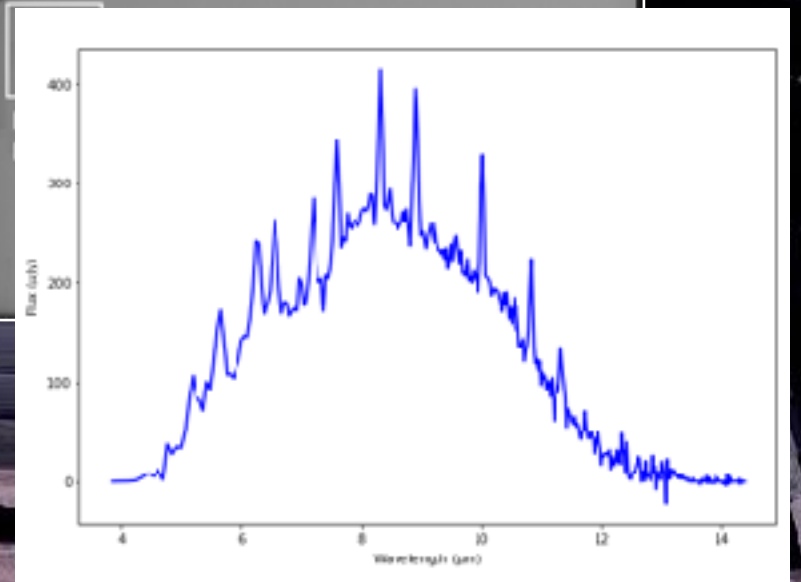
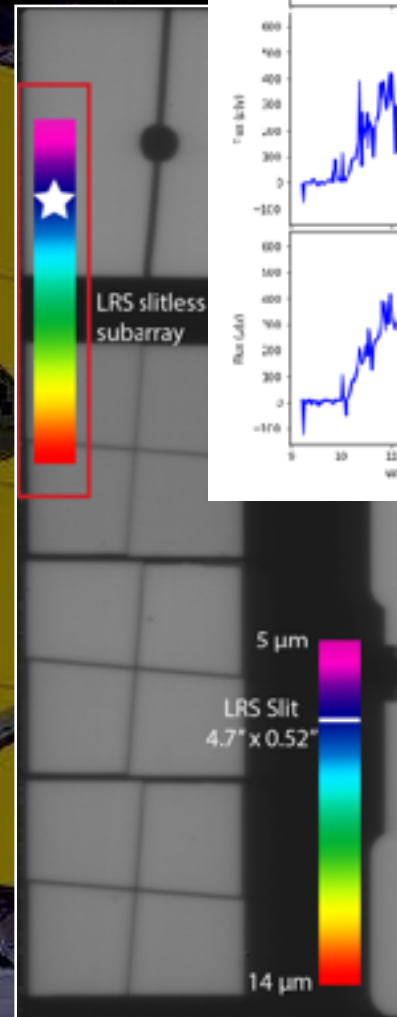
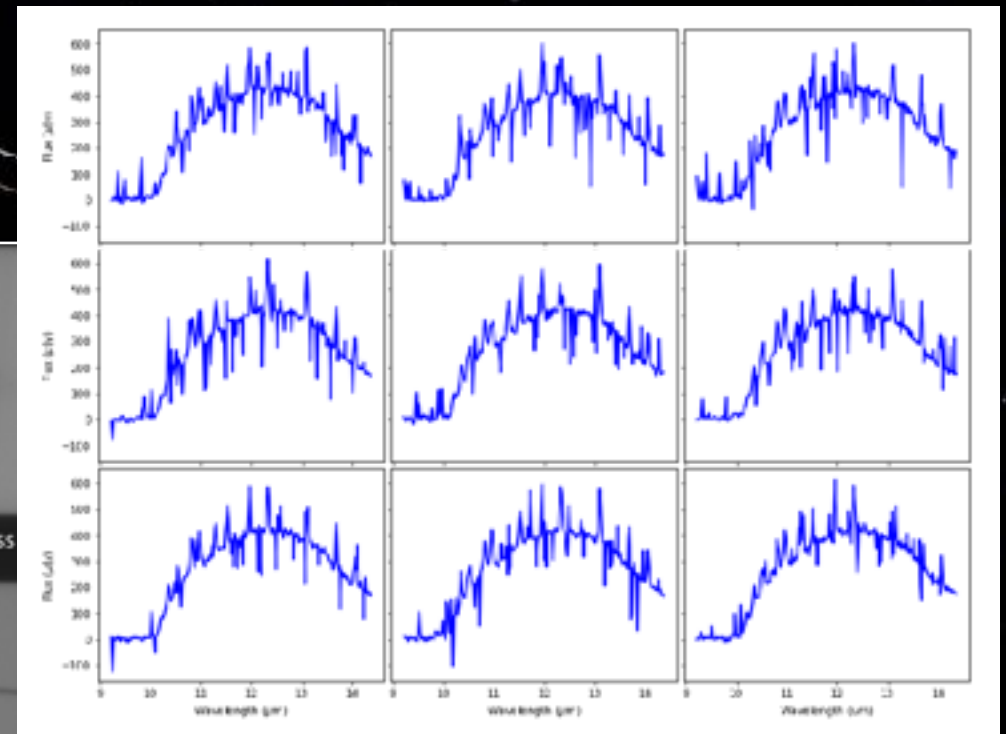
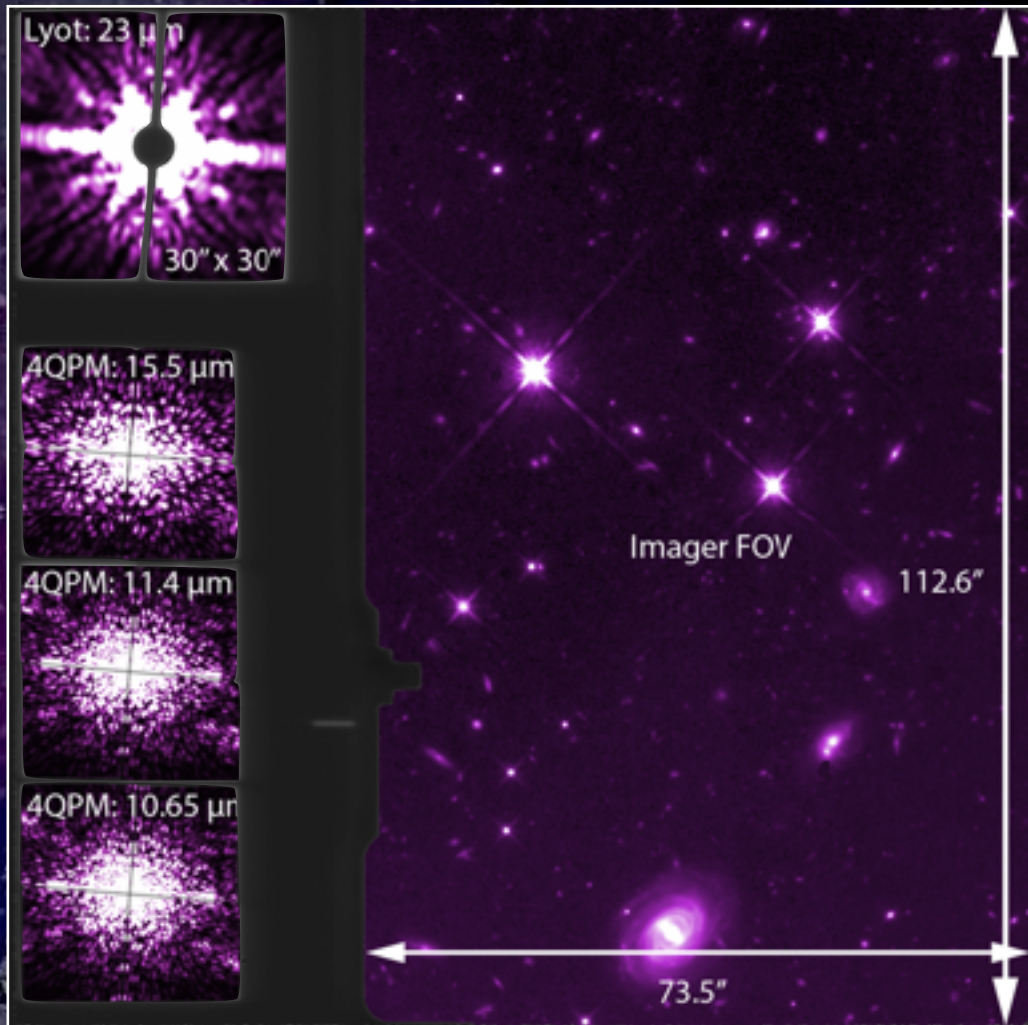
- Aperture masking interferometry



Mid-Infrared Instrument (MIRI)



MIRI Imager/Coronagraphy



MIRI LRS

Mirisim

```
vim
[sky]
name = sky0 #Name of sky scene
loglevel = 1 #0: no log, 1: single summary, 2: full report

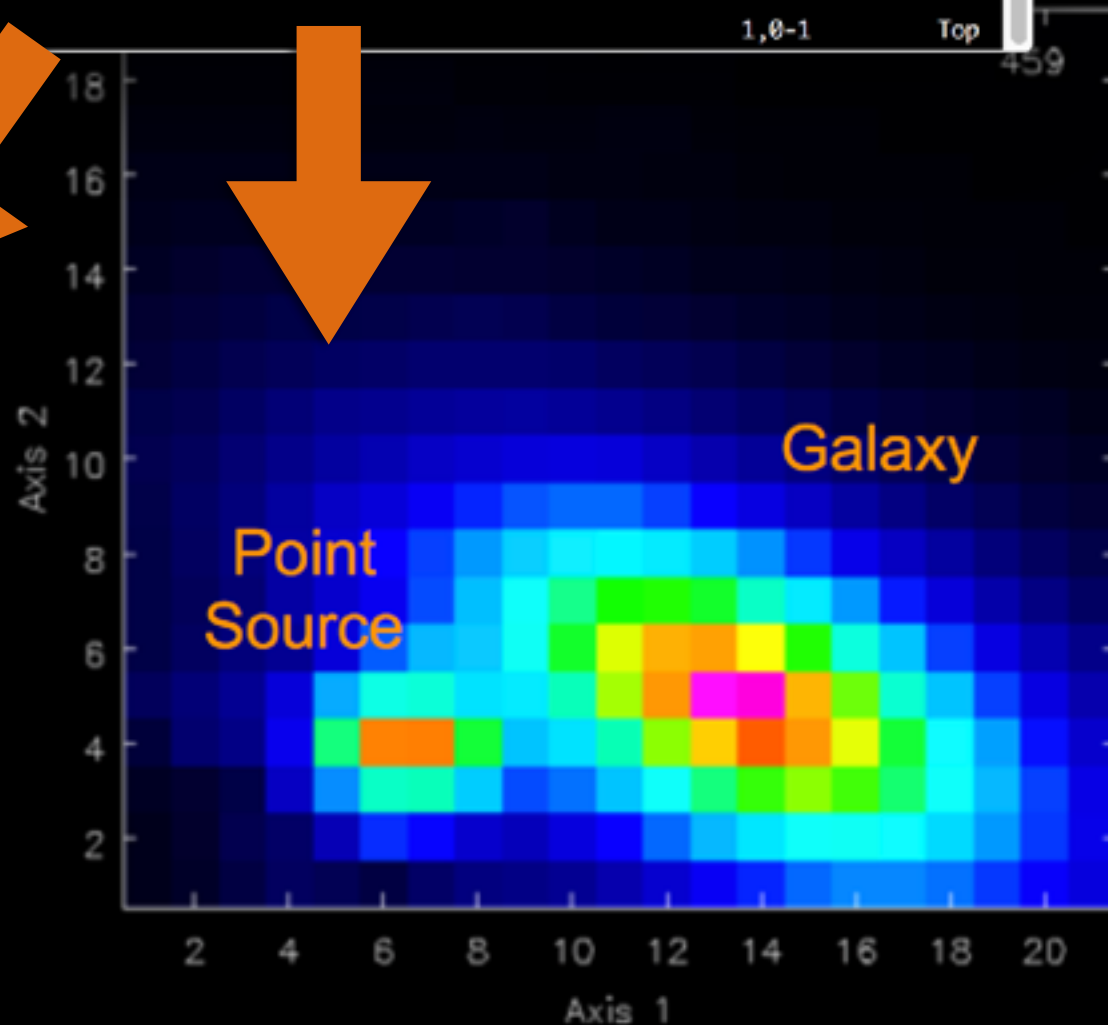
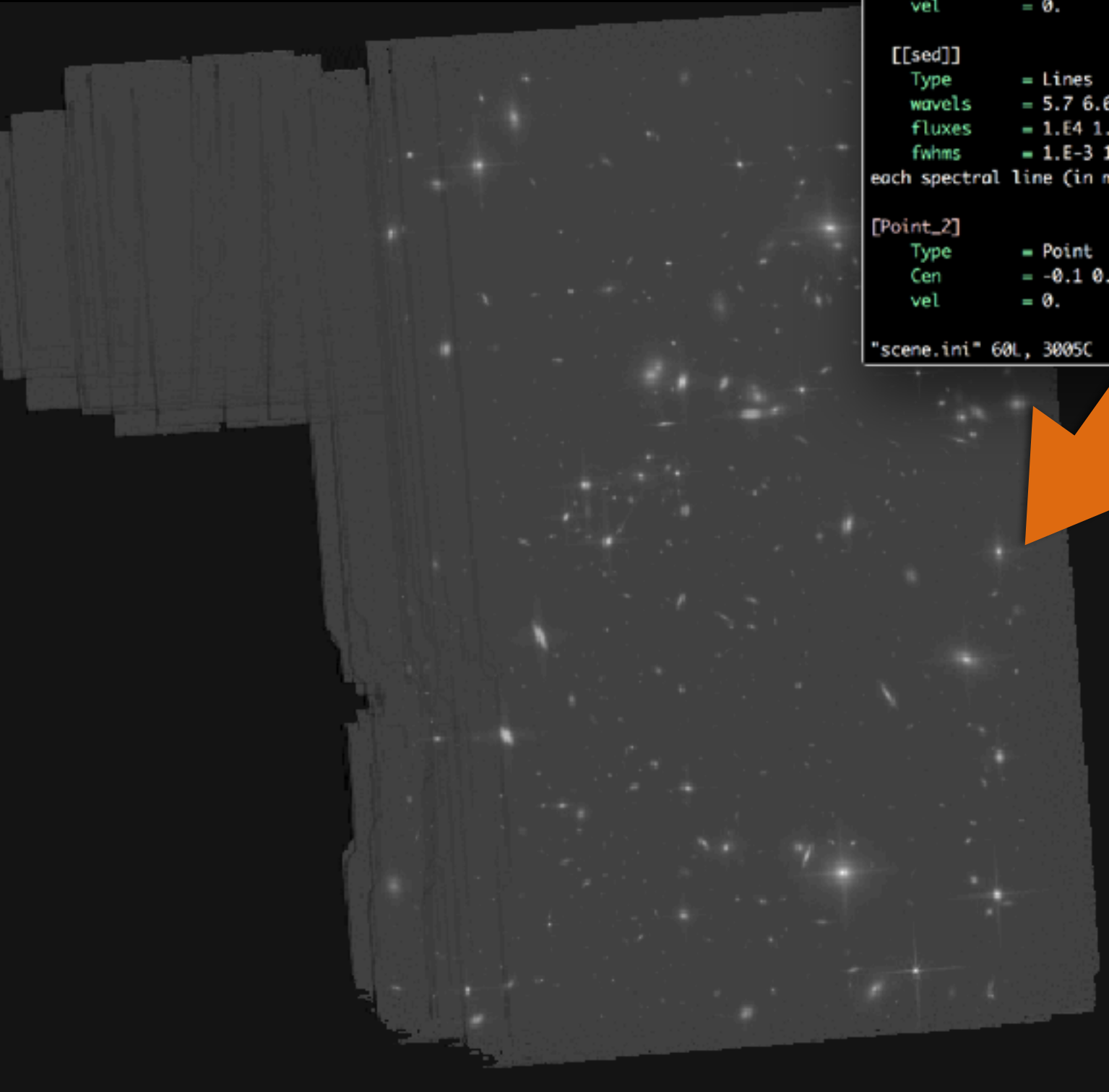
[Background]
gradient = 5. #% over 1 arcmin (JWST component only)
pa = 15. #position angle of gradient (background increasing towards PA)
centreFOV = 0. 0. #centre of FOV

[Point_1]
Type = Point #Type of target
Cen = 0.1 0.5 #Where to place the target (arcsec offsets from centreFOV).
vel = 0. #km / s

[[sed]]
Type = Lines #Type of spectral energy distribution (e.g. a set of lines)
wavels = 5.7 6.6 8.7 10.1 13.4 15.5 20.6 24.0 #line centre wavelengths (micron)
fluxes = 1.E4 1.E4 1.E4 1.E4 1.E4 1.E4 1.E4 1.E4 #Peak fluxes (in mJy) of each line
fwhms = 1.E-3 1.E-3 1.E-3 1.E-3 1.E-3 1.E-3 1.E-3 1.E-3 #Full Width at Half Maximum of
each spectral line (in micron)

[Point_2]
Type = Point #Type of target
Cen = -0.1 0.5 #Where to place the target (arcsec offsets from centreFOV).
vel = 0. #km / s

"scene.ini" 60L, 3005C 1,0-1 Top
```





**Jak vznikaly
galaxie?**



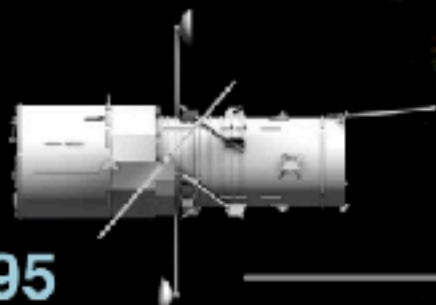
**Jak vznikaly planety
a hvězdy?**



Jsme sami?



1990
Ground-based observatories



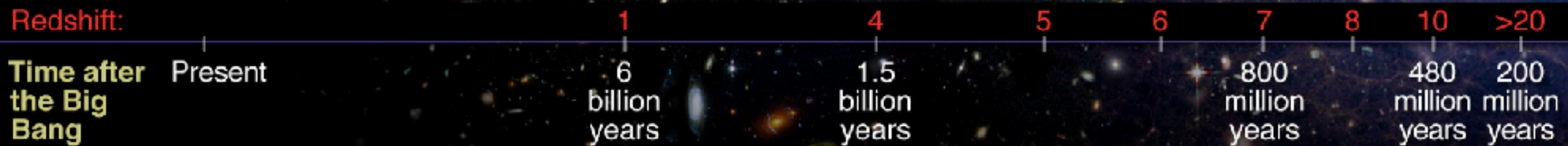
1995
Hubble Deep Field

2004
Hubble Ultra Deep Field

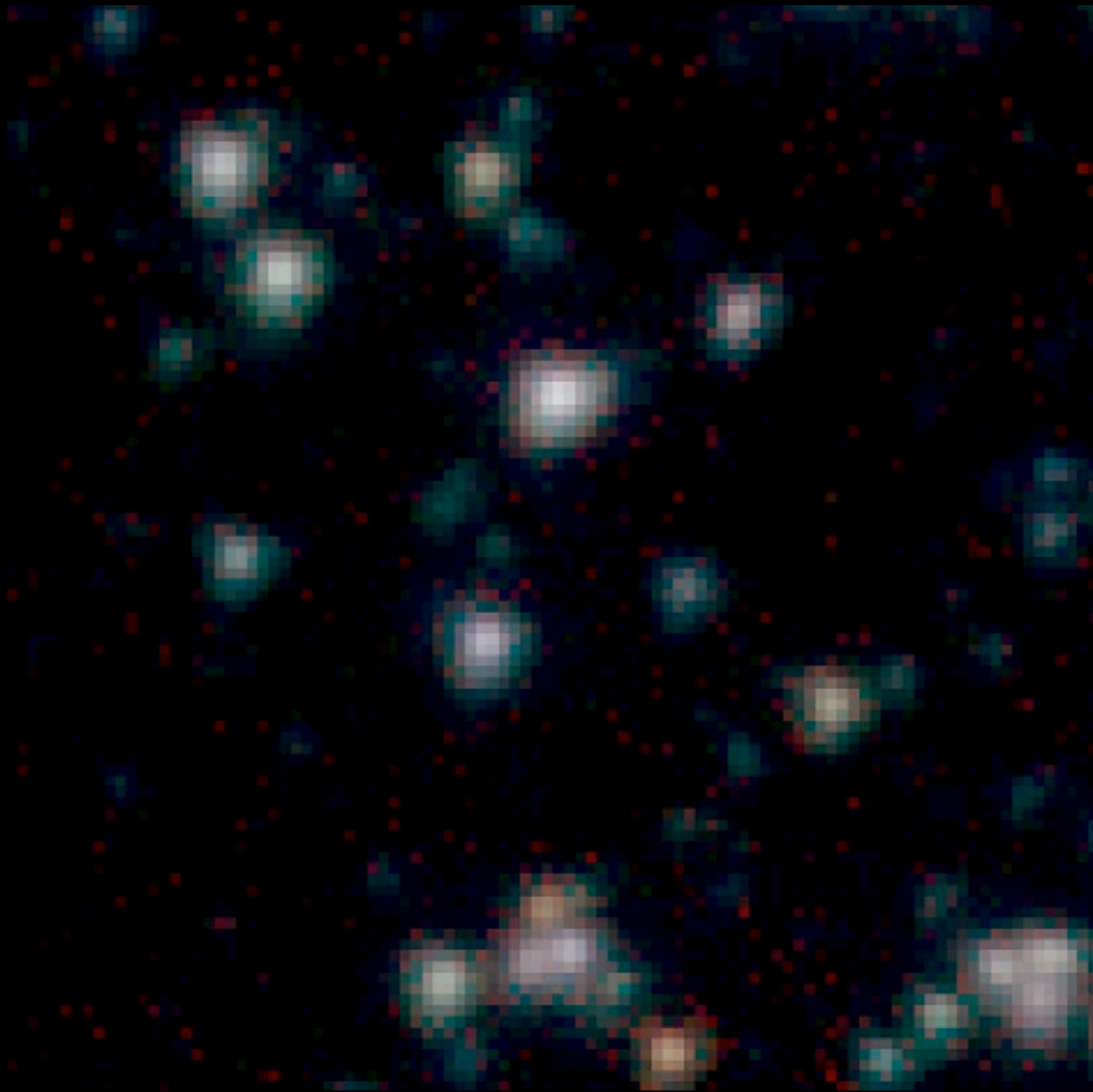
2010
Hubble Ultra Deep Field-Infrared



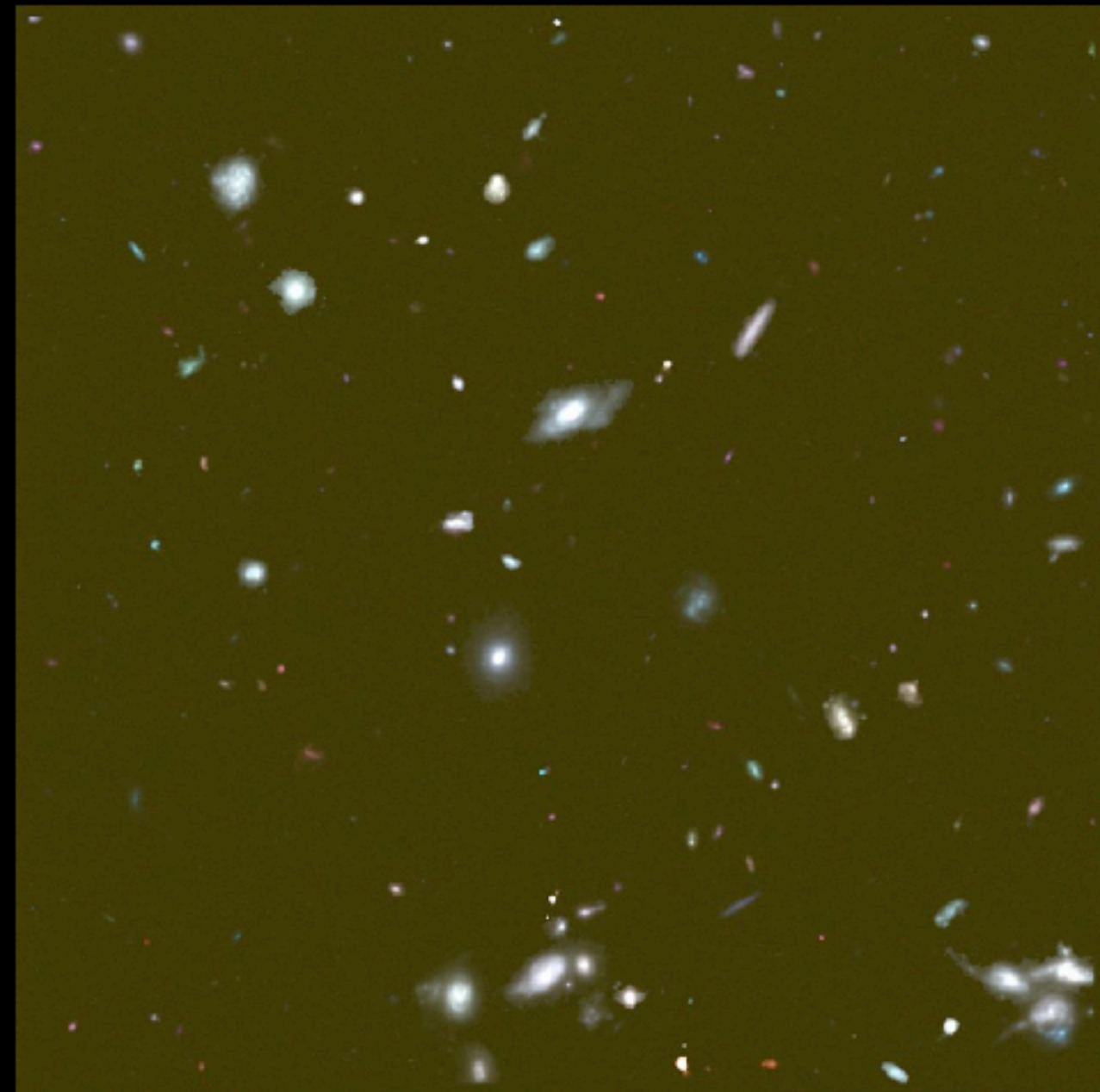
FUTURE
James Webb Space Telescope



JWST deep and ultra-deep field



Spitzer 25 h

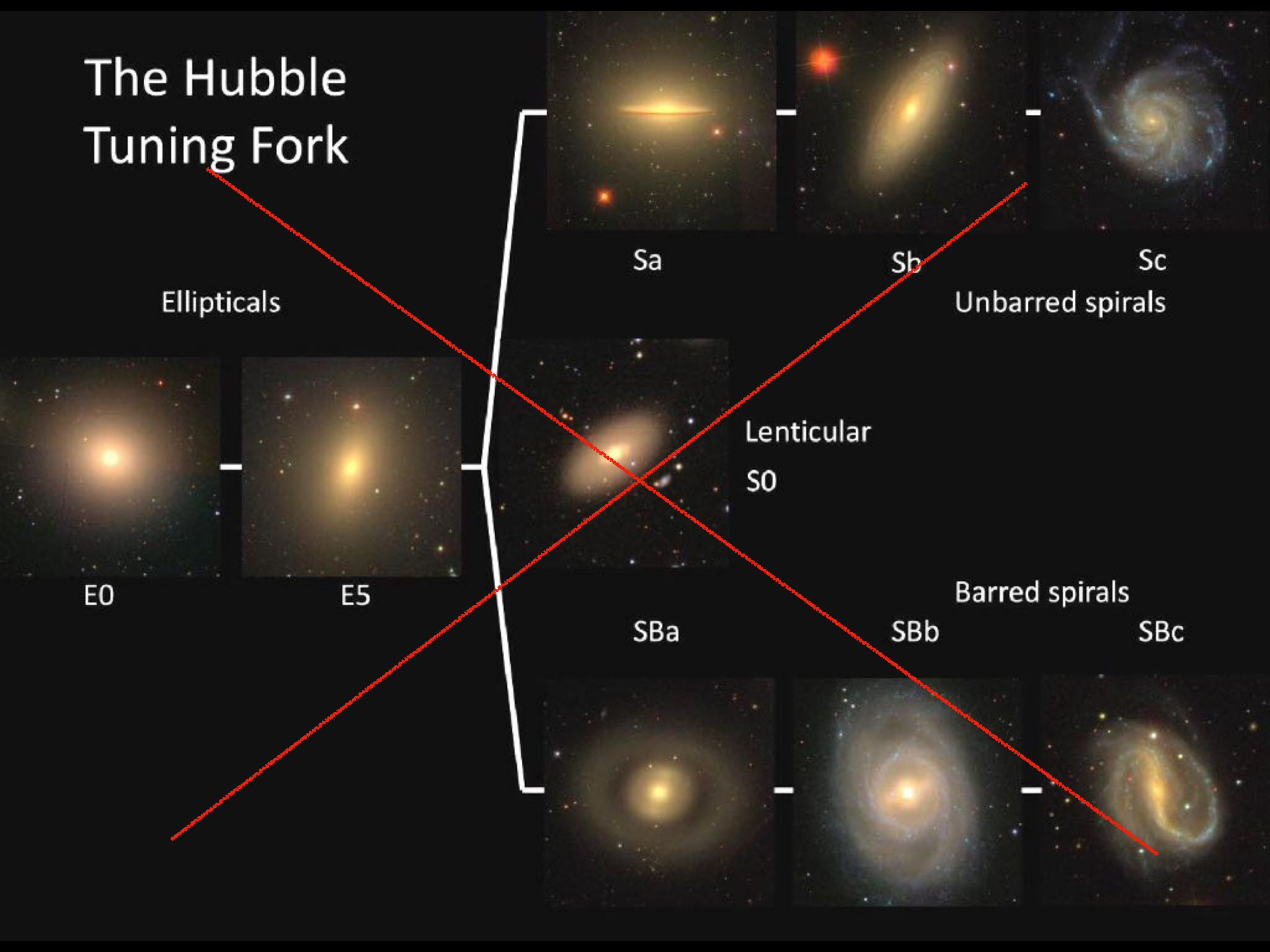


JWST 1000 s (simulace)

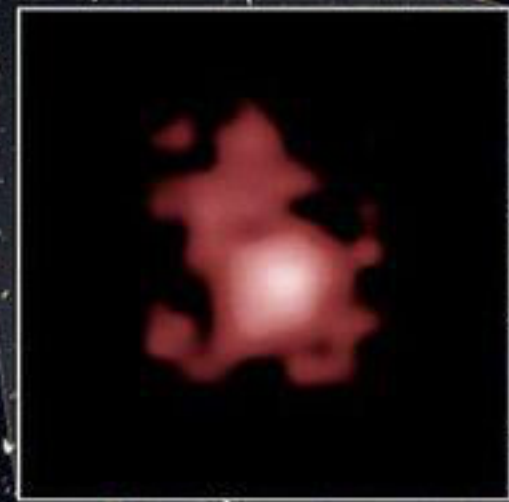
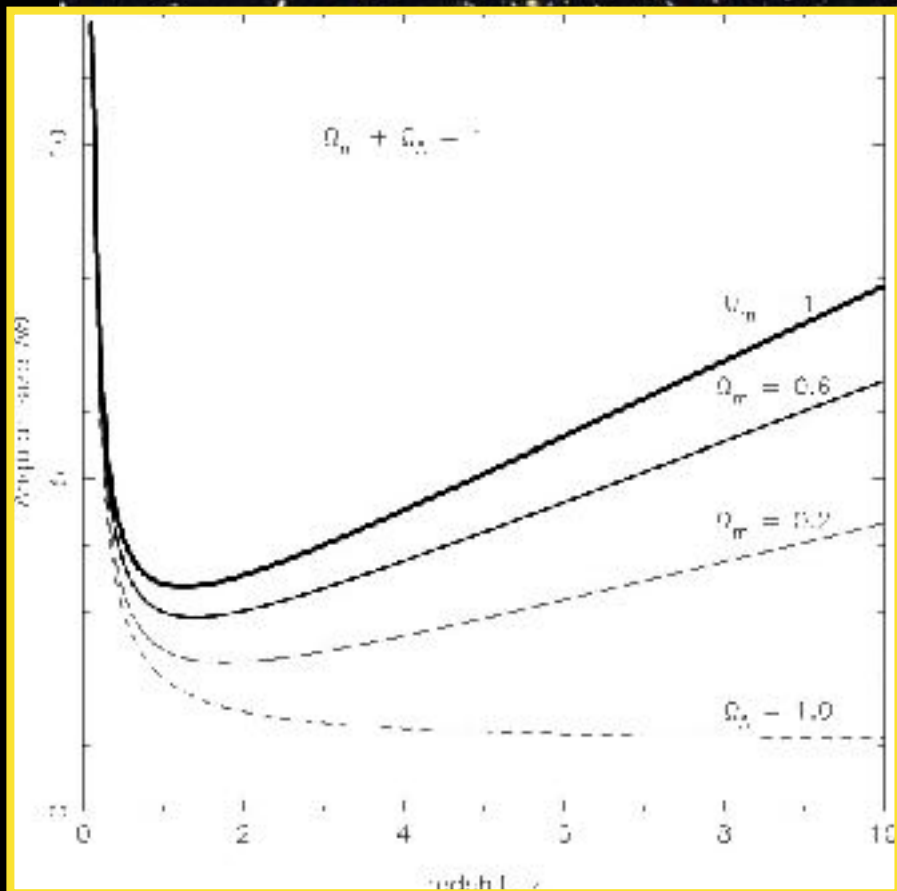
**Jak vznikly galaxie
a jak se vyvíjí?**



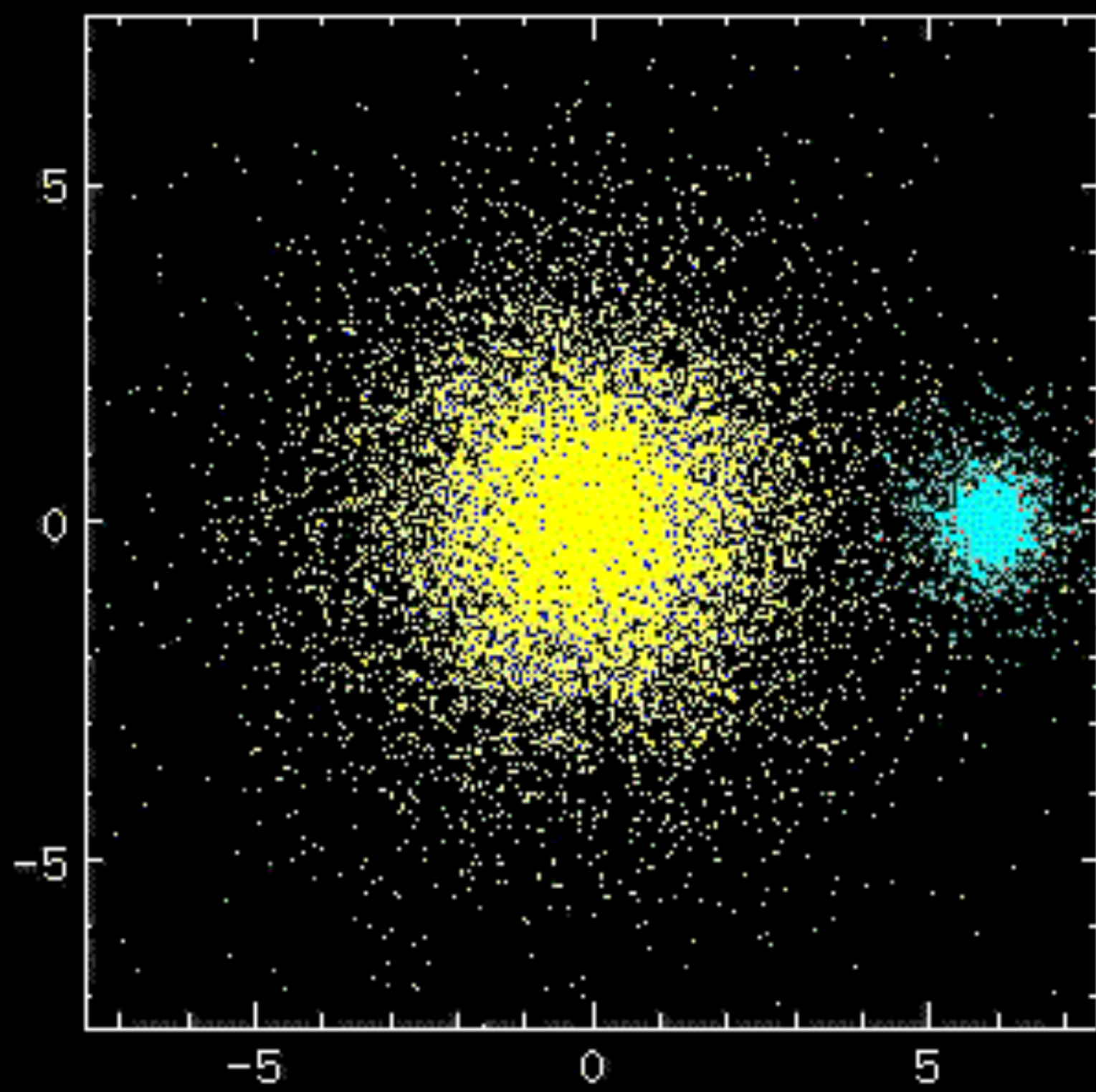
The Hubble Tuning Fork

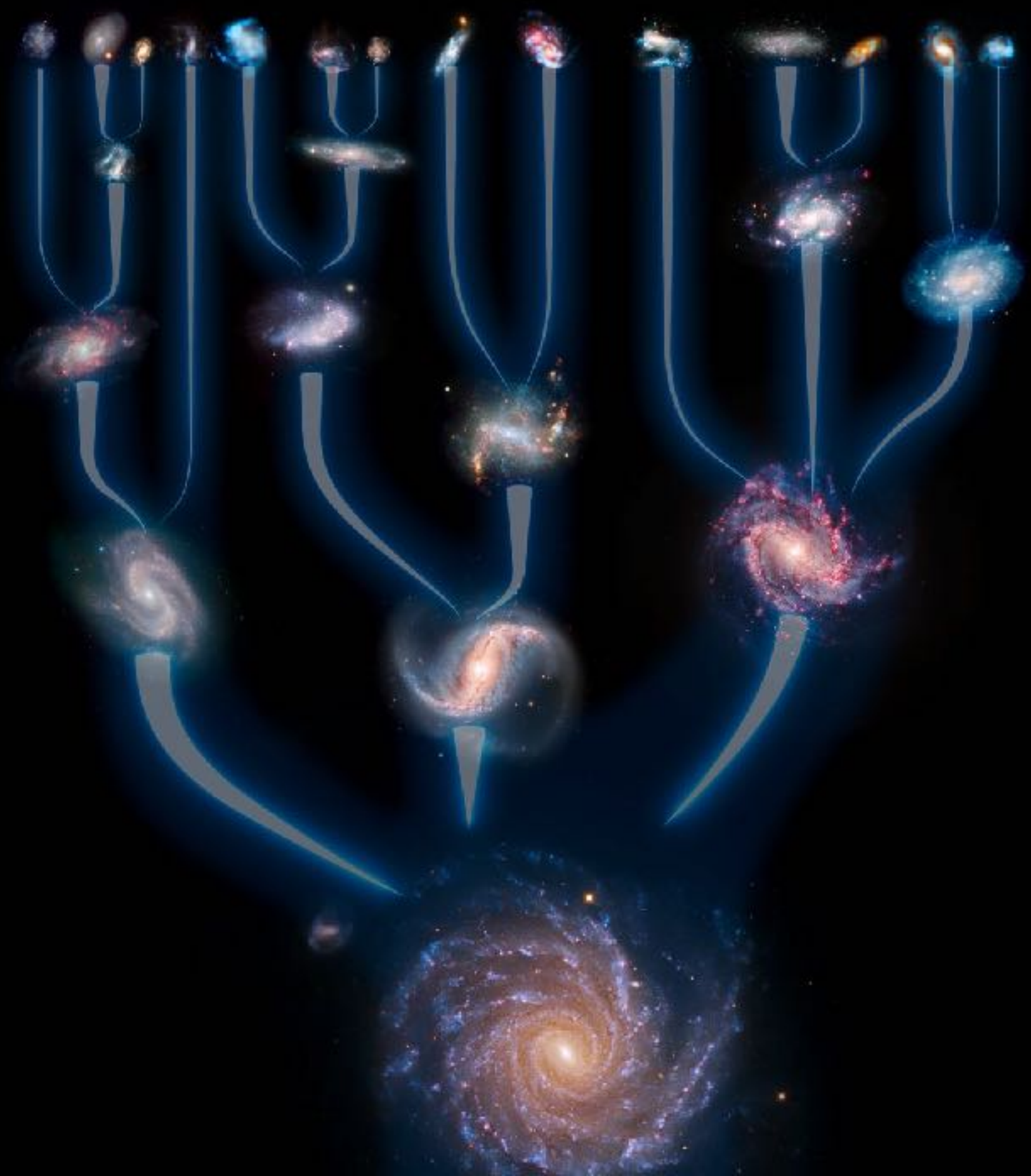






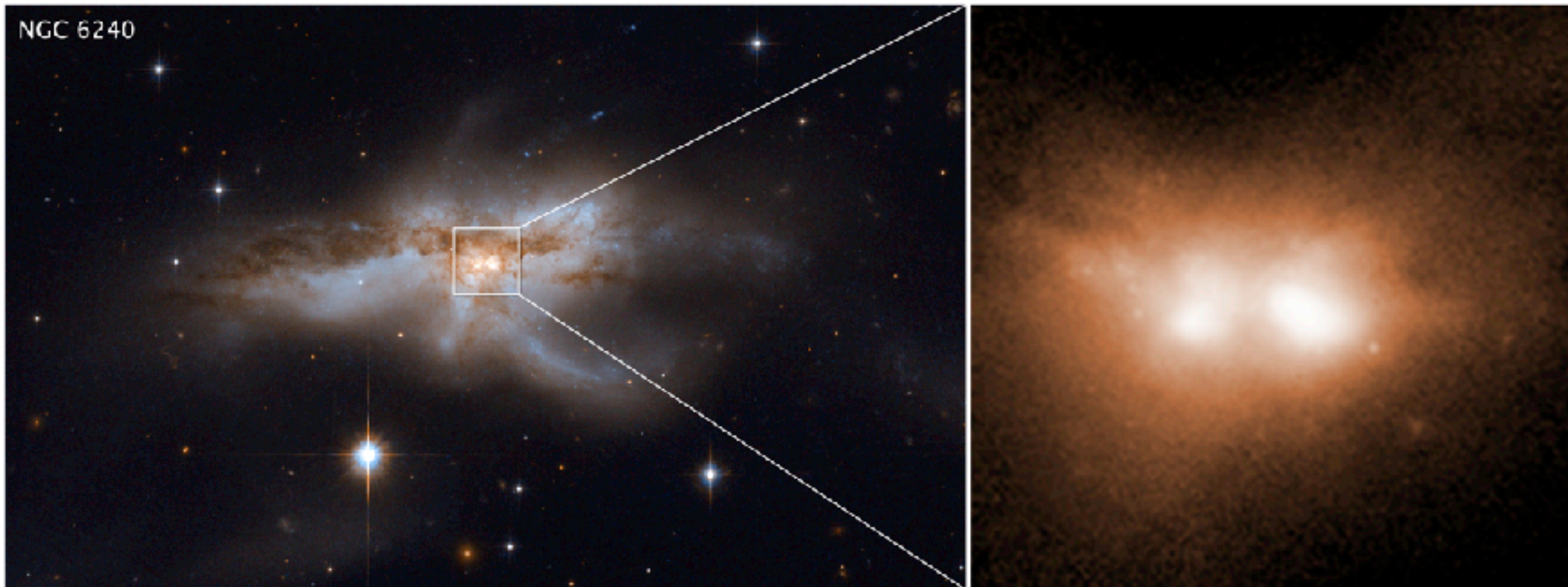
$z \sim 11$
 (před 13.4 mld lety)



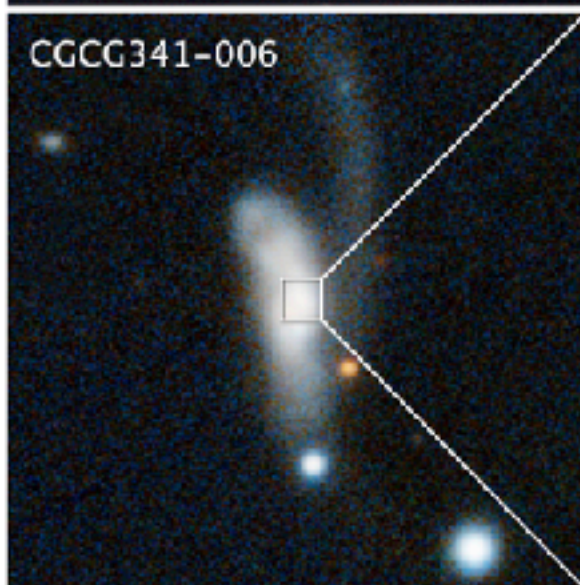




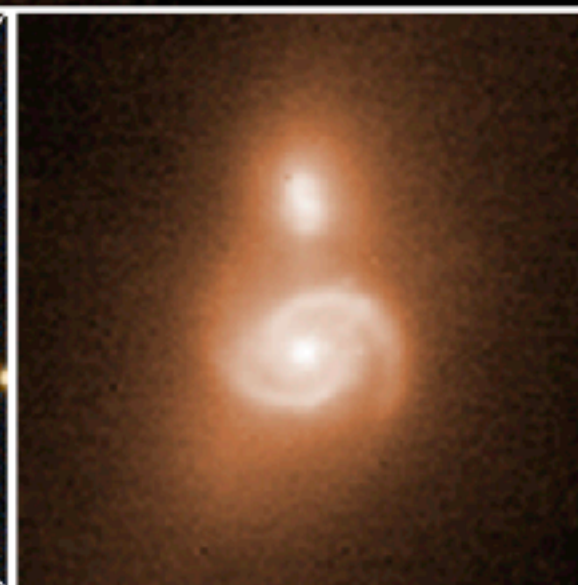
NGC 6240



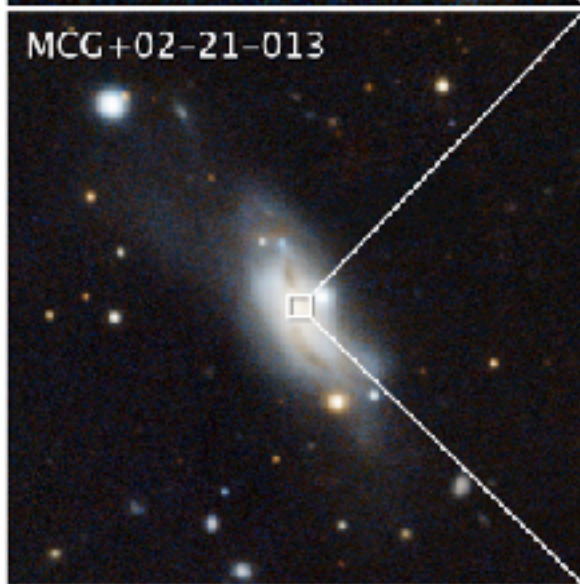
CGCG341-006



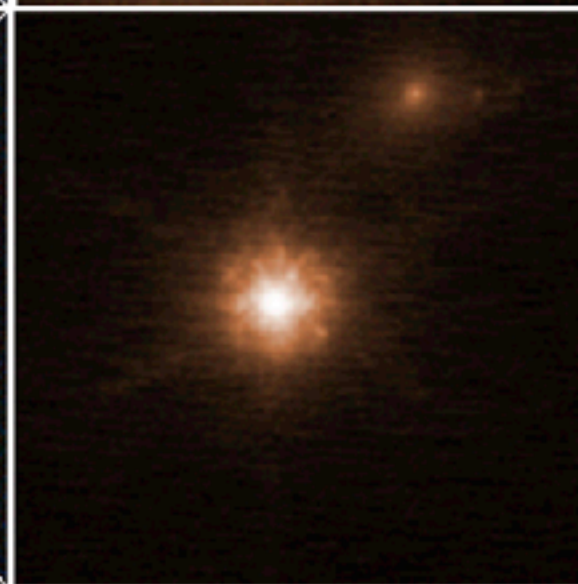
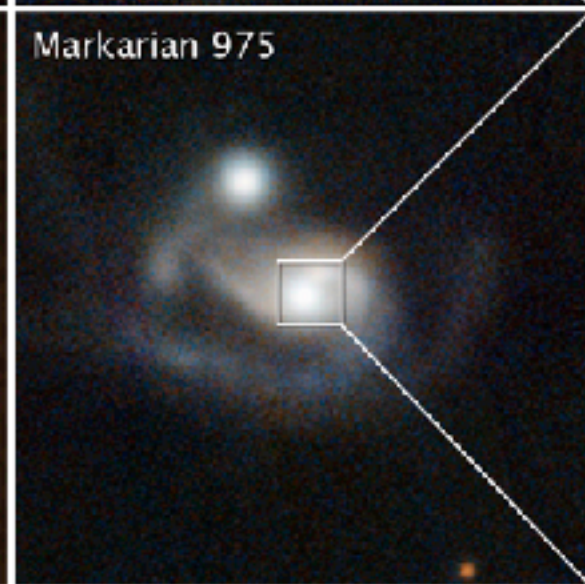
2MASSXJ01392400+2924067



MCG+02-21-013

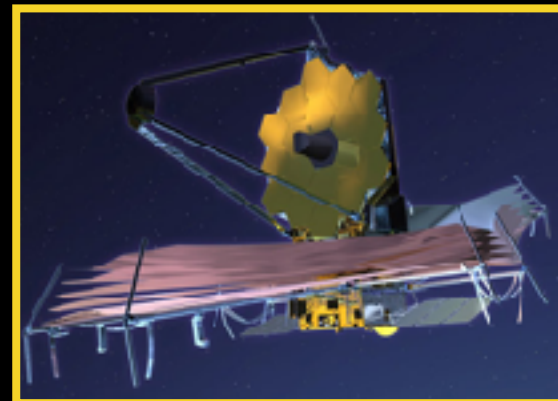


Markarian 975

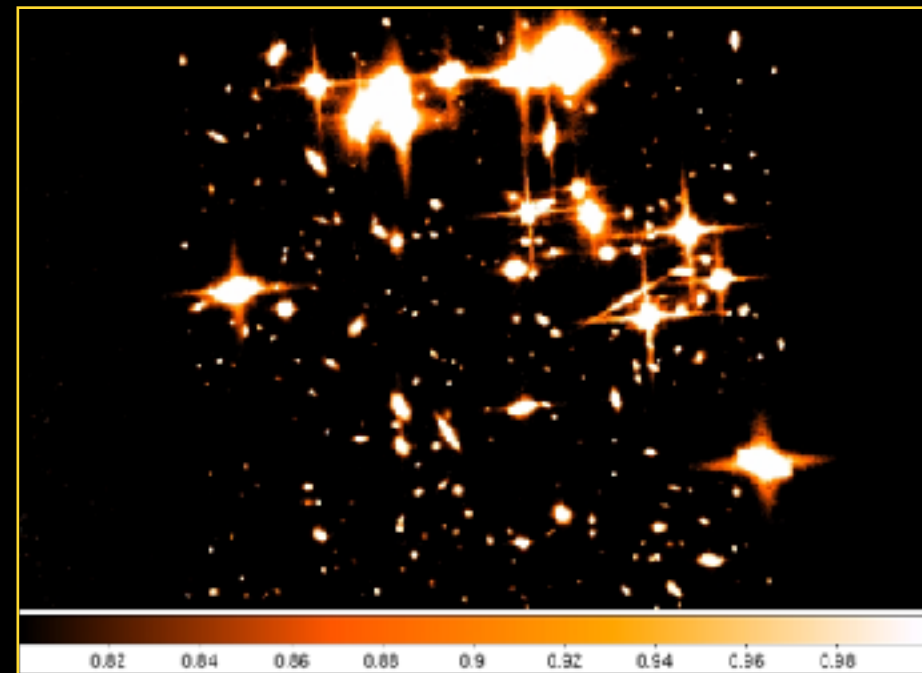
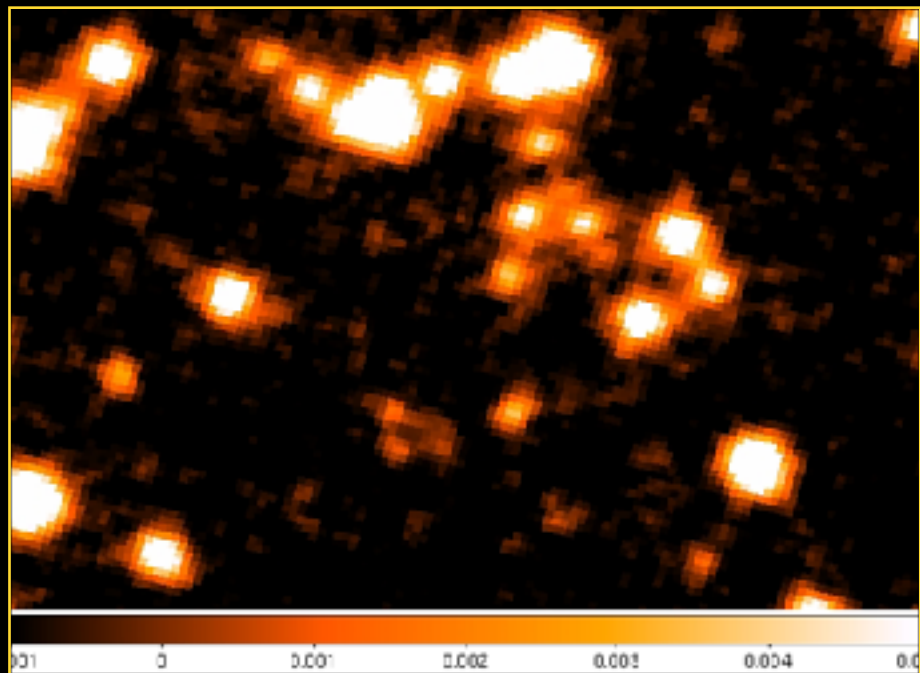




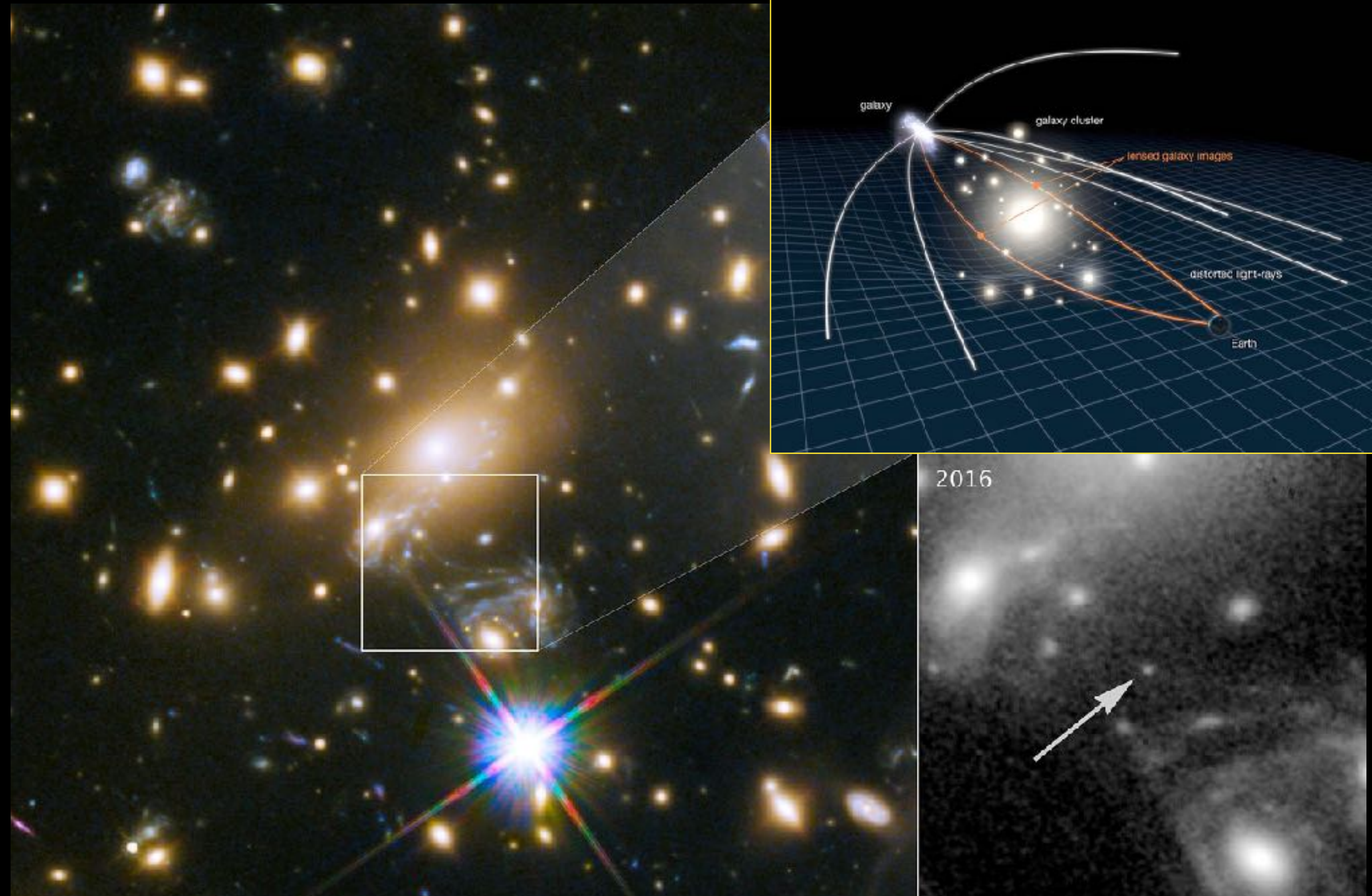
Distant galaxies in deep space in the Hubble Ultra Deep Field photograph.
Credit: NASA/ESA



A simulated image of James Webb Space Telescope performance.
Credit: STScI



HST: Icarus (MACS J1149+2223 Lensed Star 1) $z = 1.5$



Eagle nebula M16 a „Sloupy stvoření“ (HST)

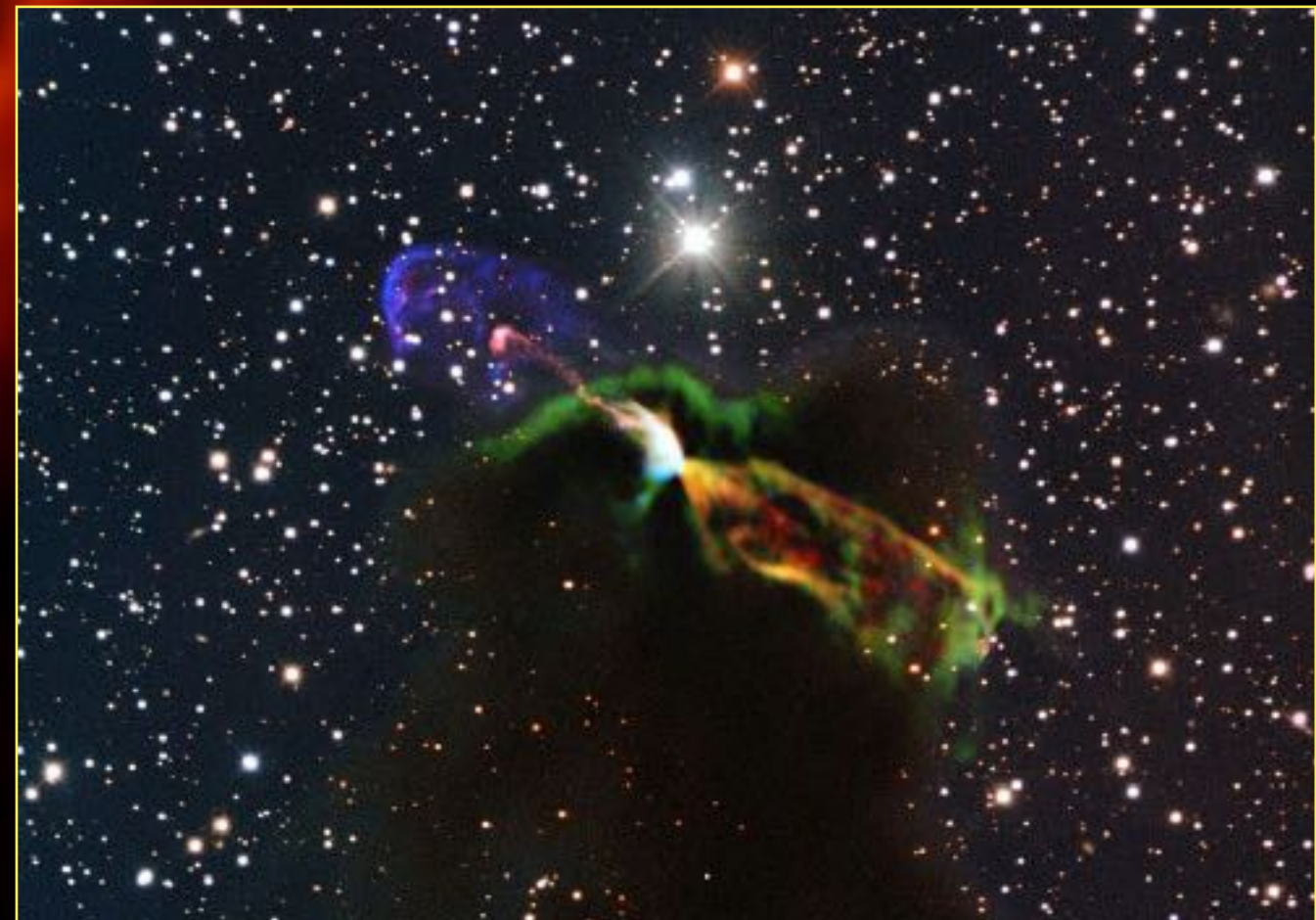






Protoplanetární system HL Tau (ALMA, 1.3mm)

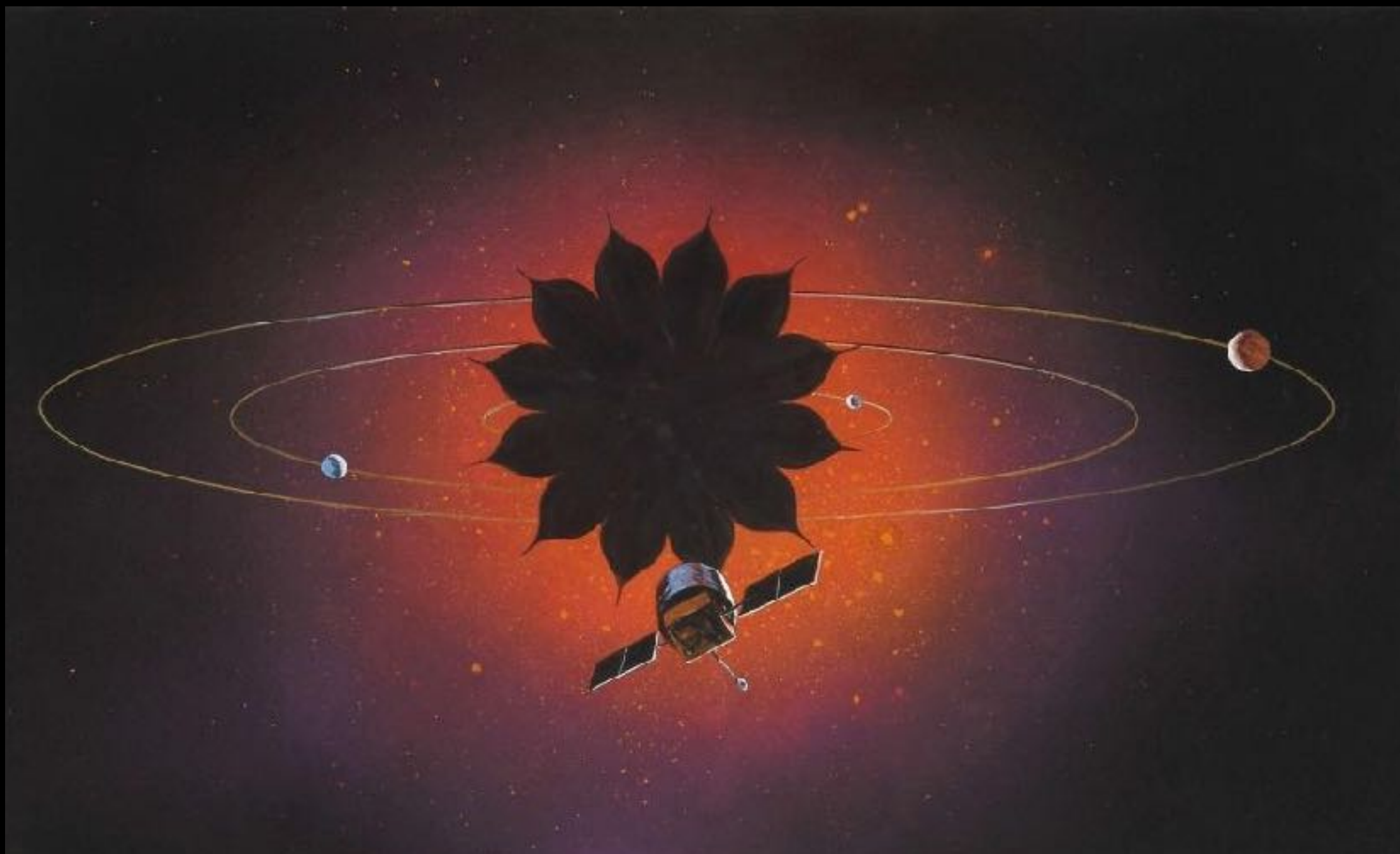
Herbig Haro objekt HH 46/47



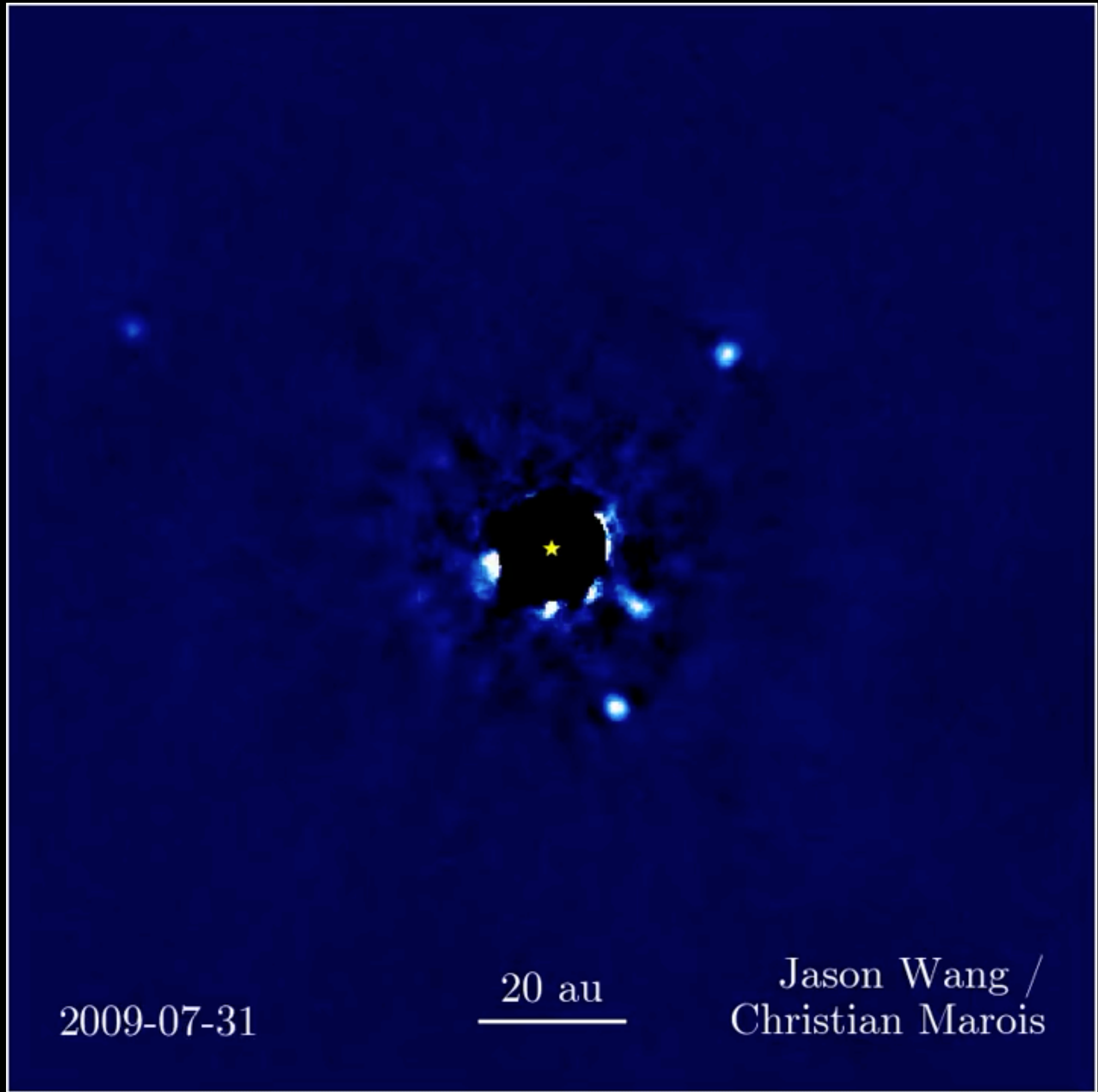
Přímé pozorování



Přímé pozorování



HR 8799

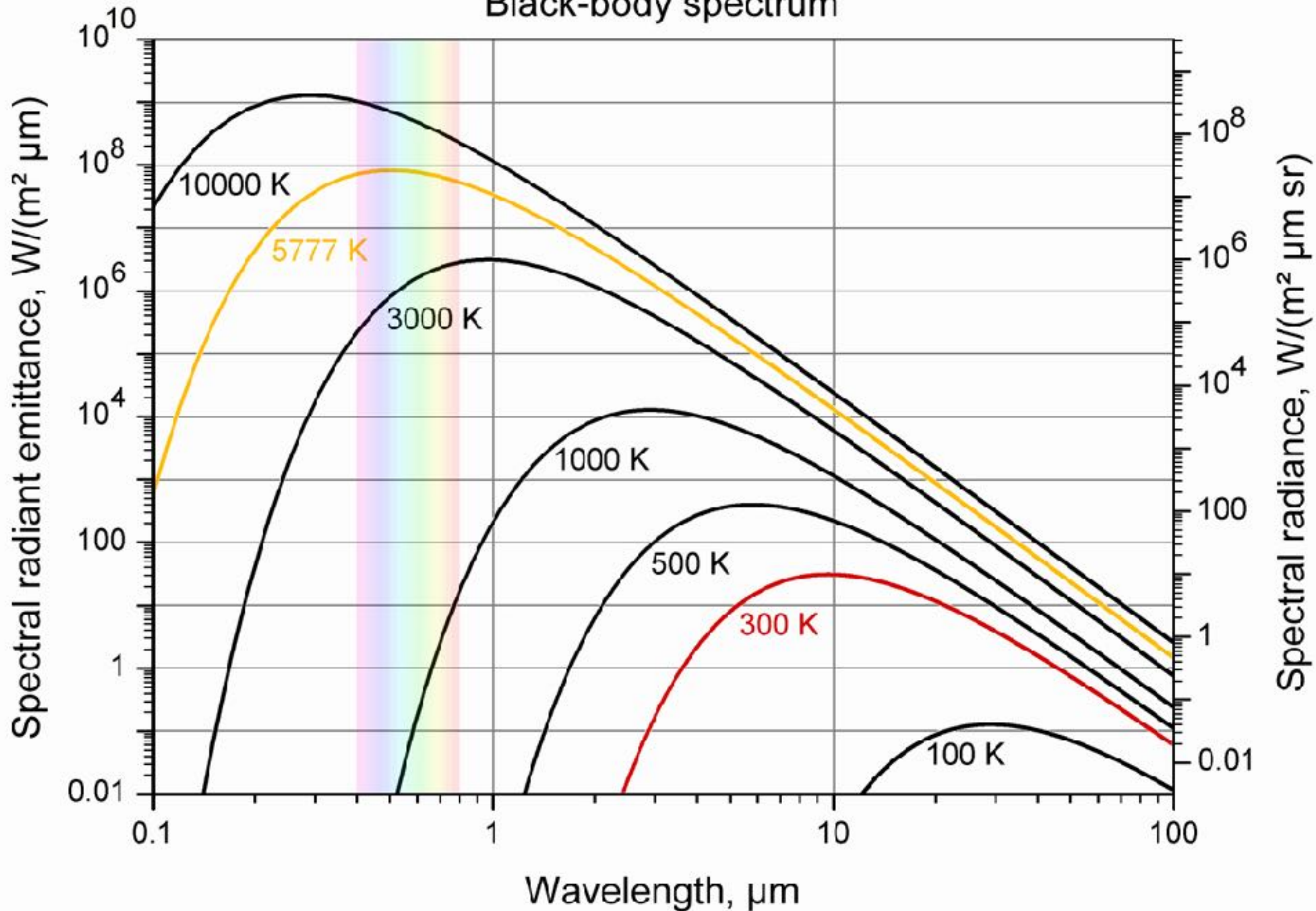


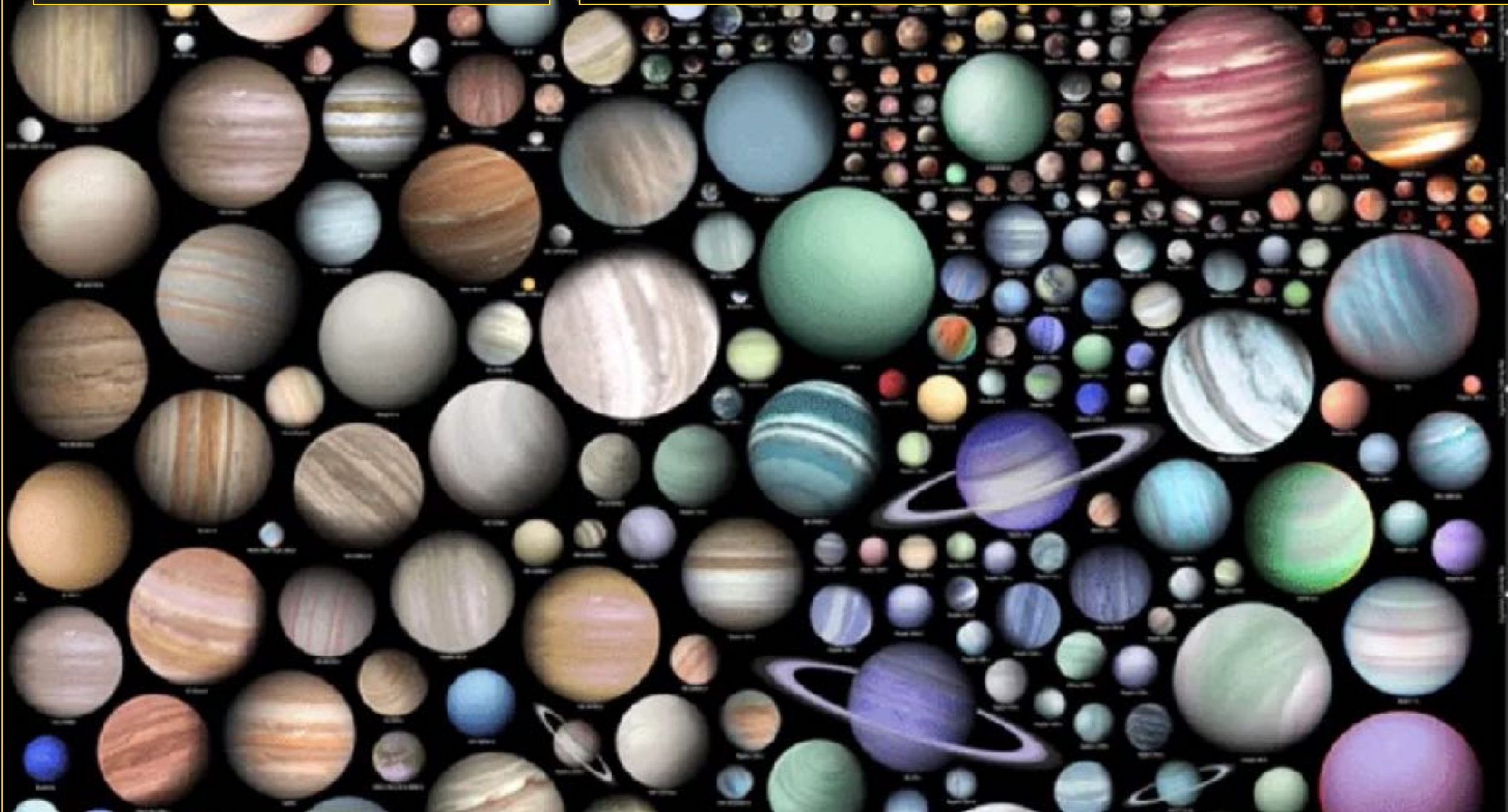
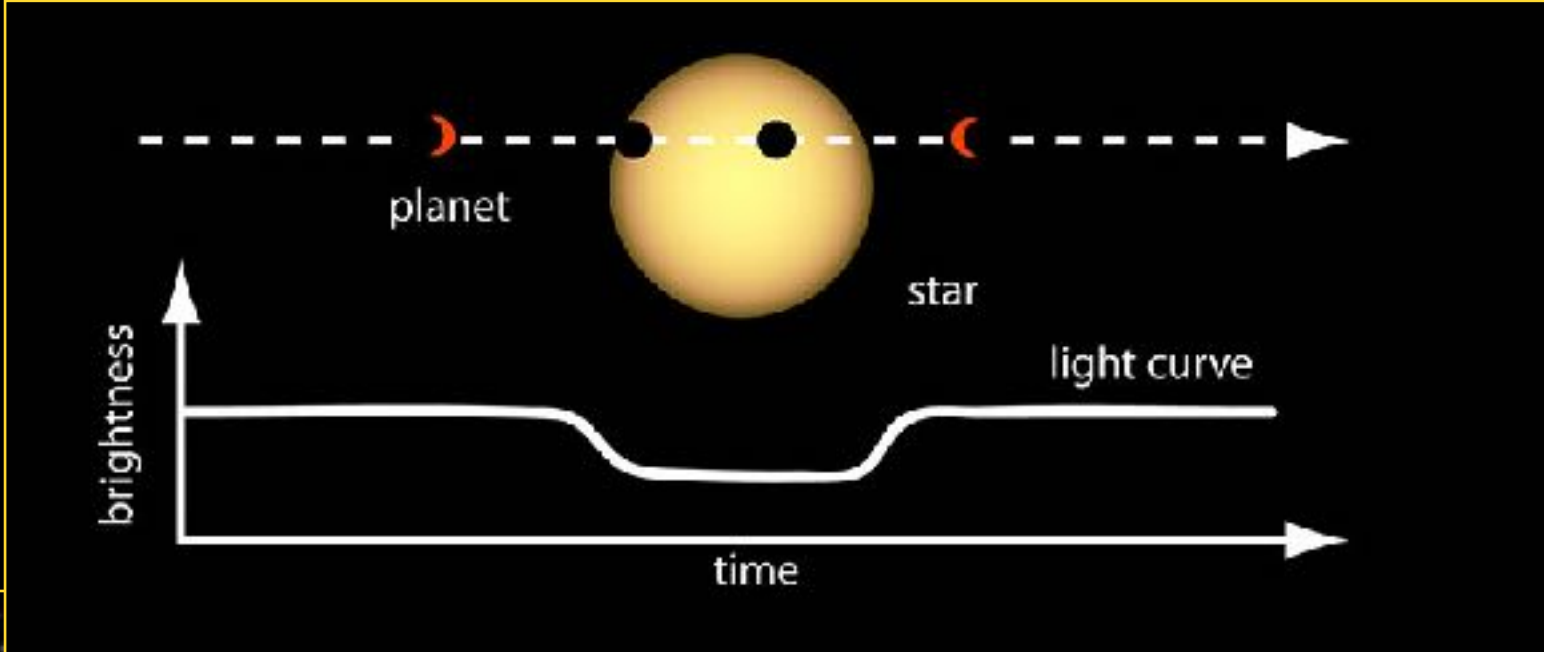
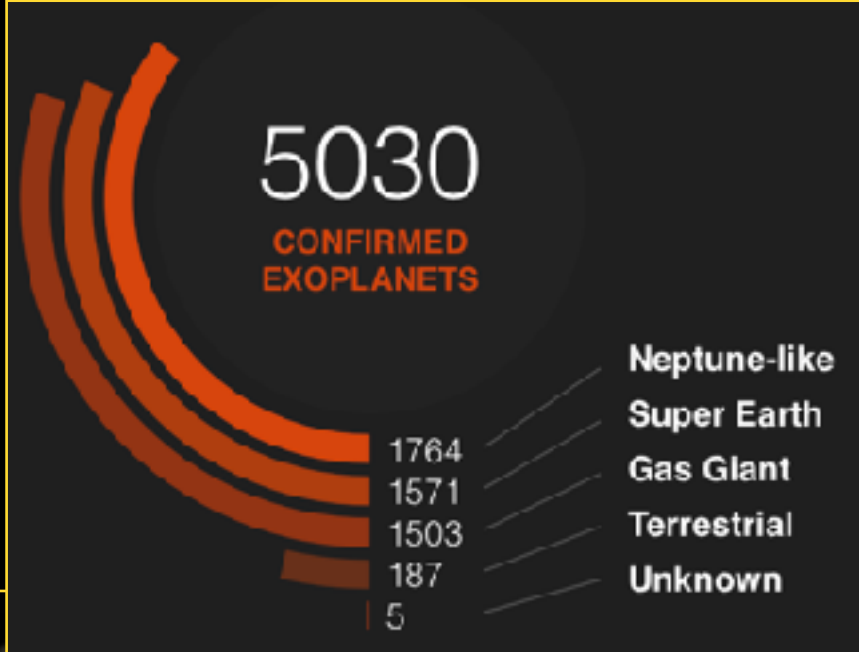
2009-07-31

20 au

Jason Wang /
Christian Marois

Black-body spectrum



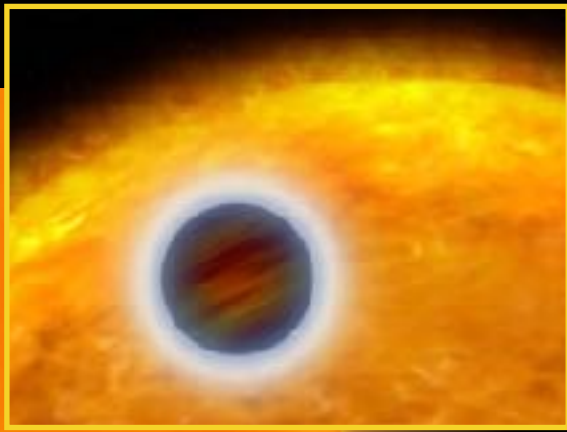




**Jsou na vzdálených
planetách vhodné podmínky
pro život?**



Atmosféry Exoplanet



Star

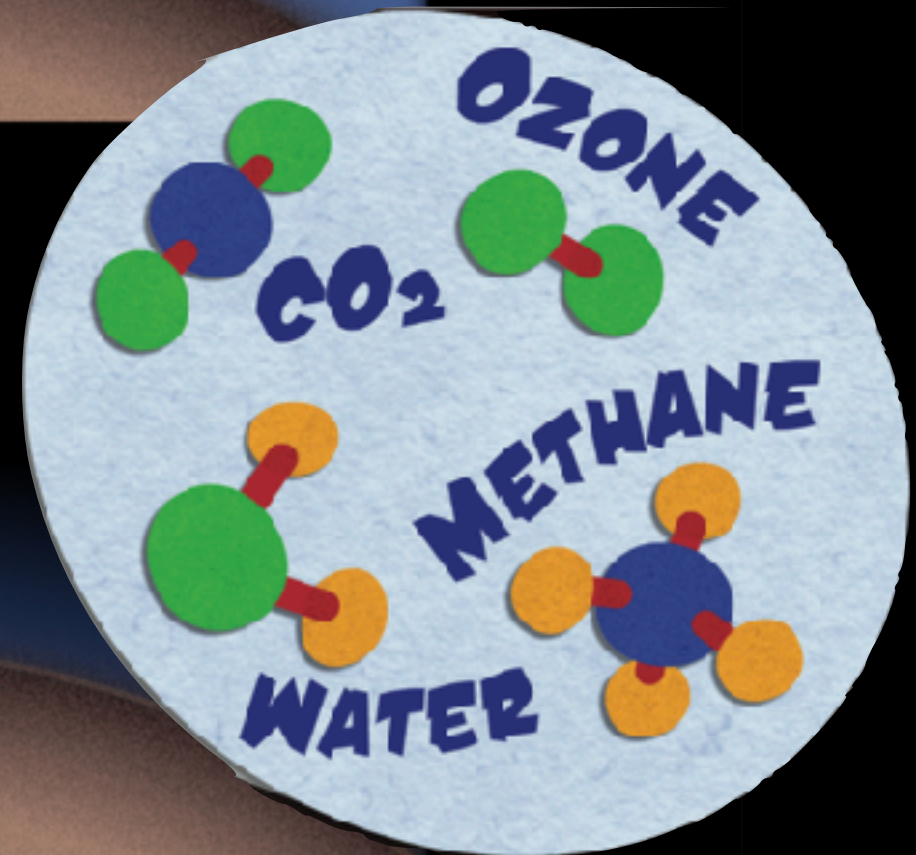
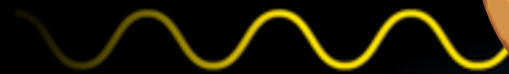
a

Stellar photon

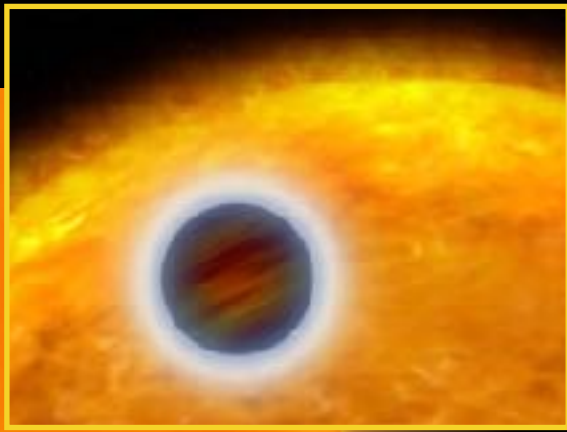


Observer

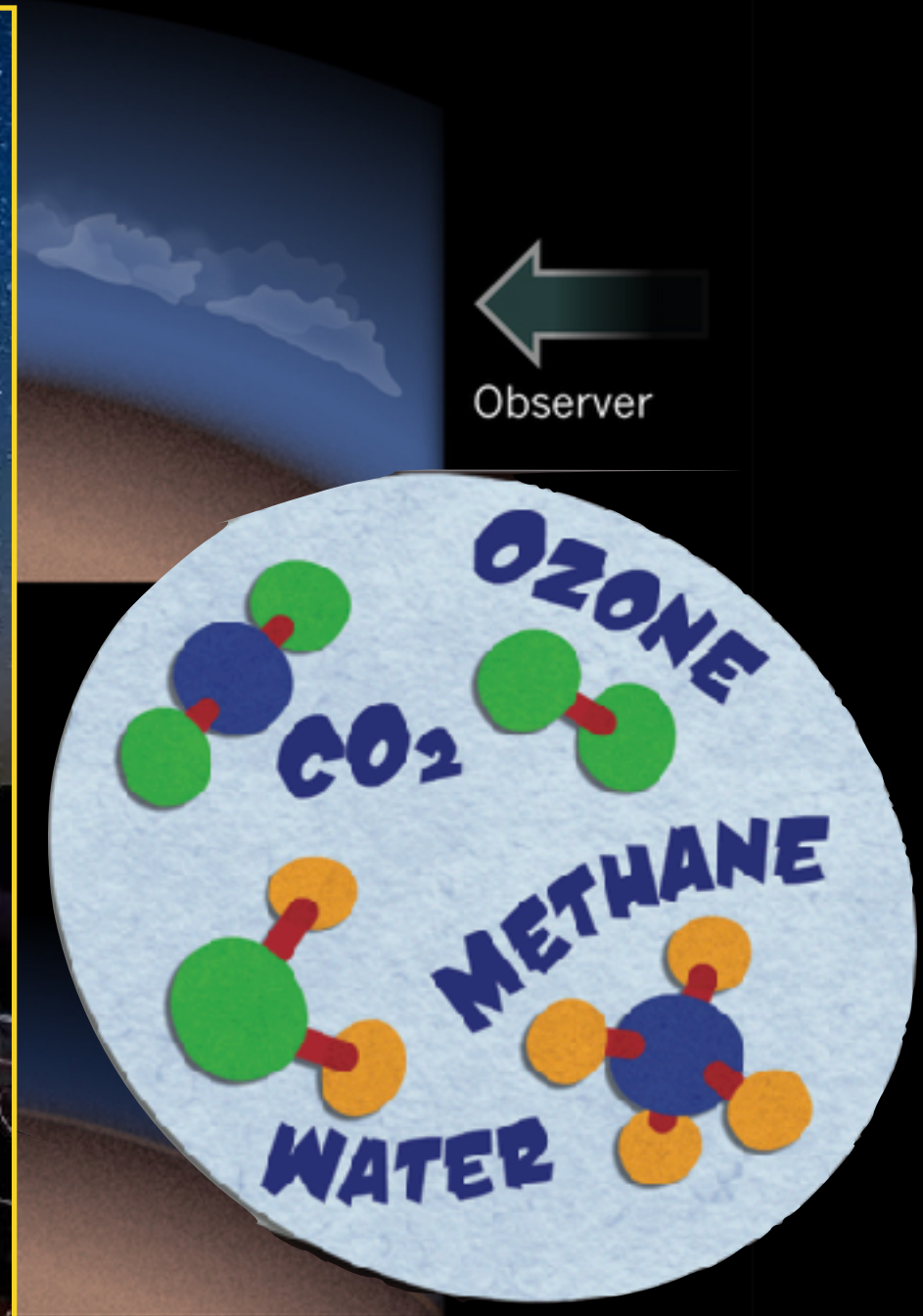
b



Atmosféry Exoplanet



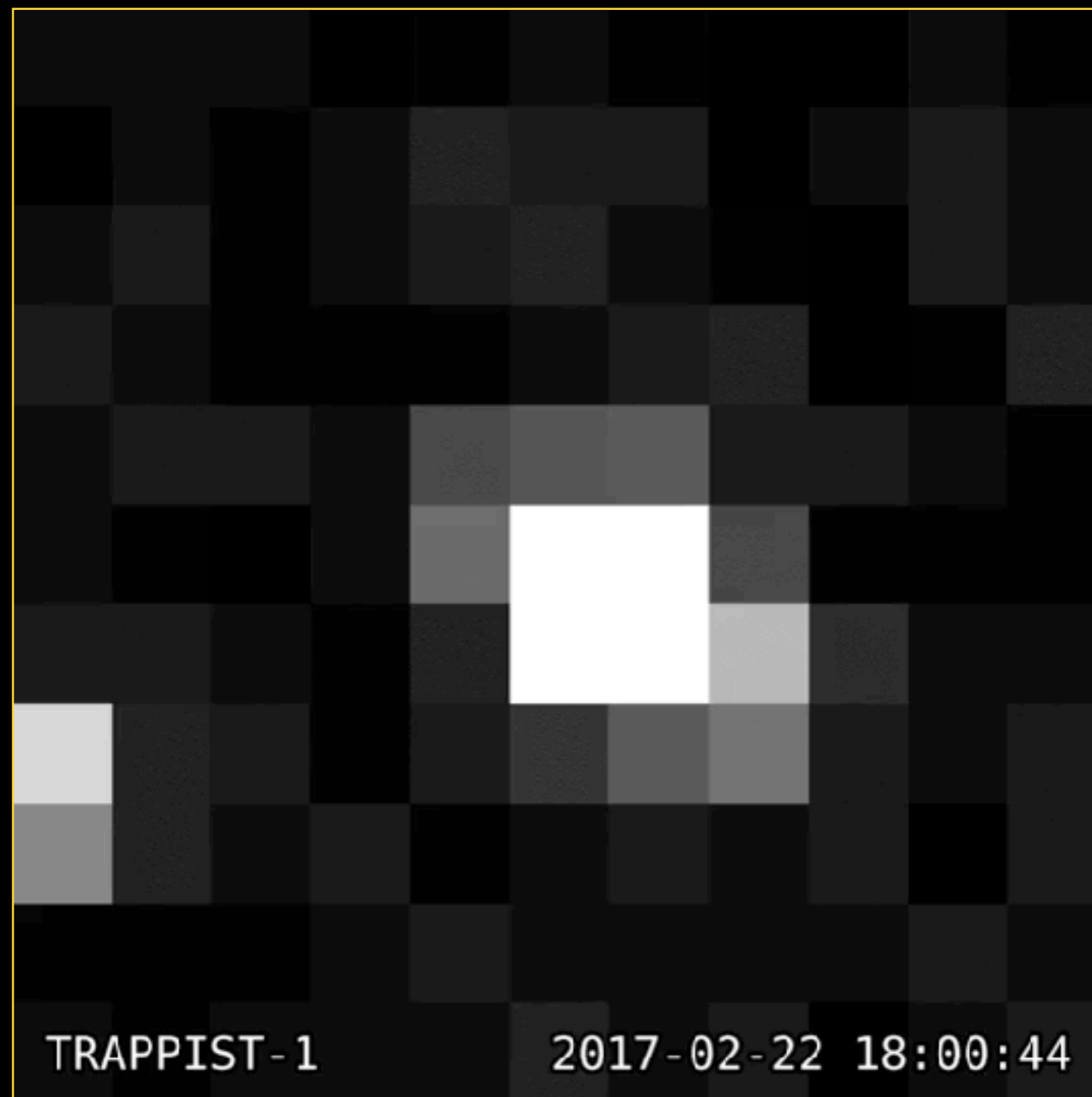
Star



Exoplanety a vznik života

Někdy si říkám, že nejpádnější důkaz toho, že inteligentní život existuje ještě někde jinde, je, že se nás ještě nikdo kontaktovat nepokusil.





TRAPPIST-1

2017-02-22 18:00:44



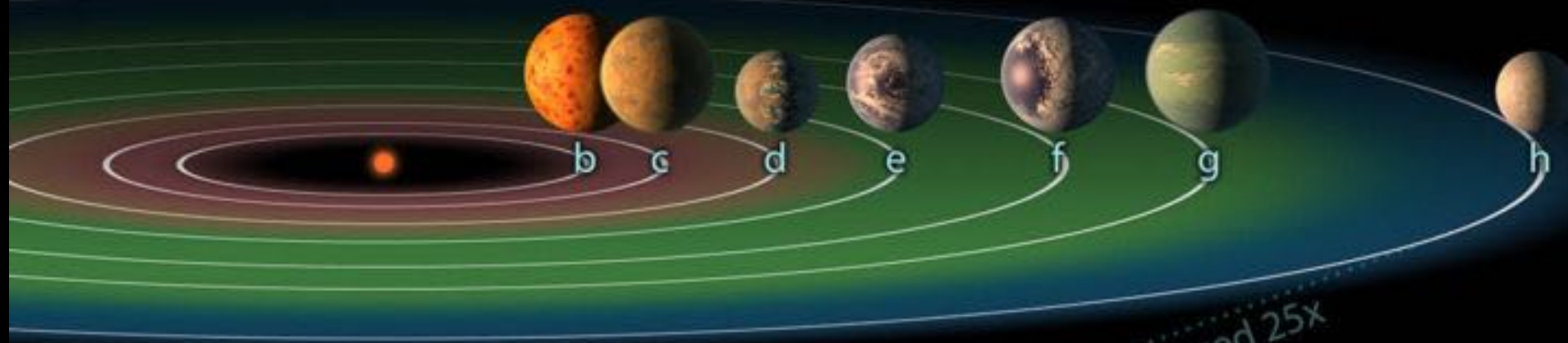
PLANET HOP FROM

TRAPPIST-1e

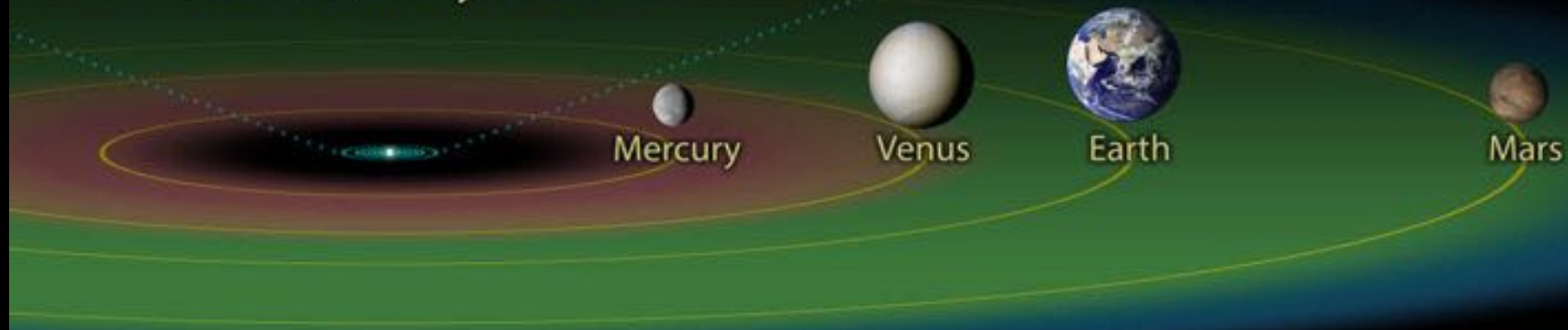


VOTED BEST "HAB ZONE" VACATION WITHIN 12 PARSECS OF EARTH

TRAPPIST-1 System



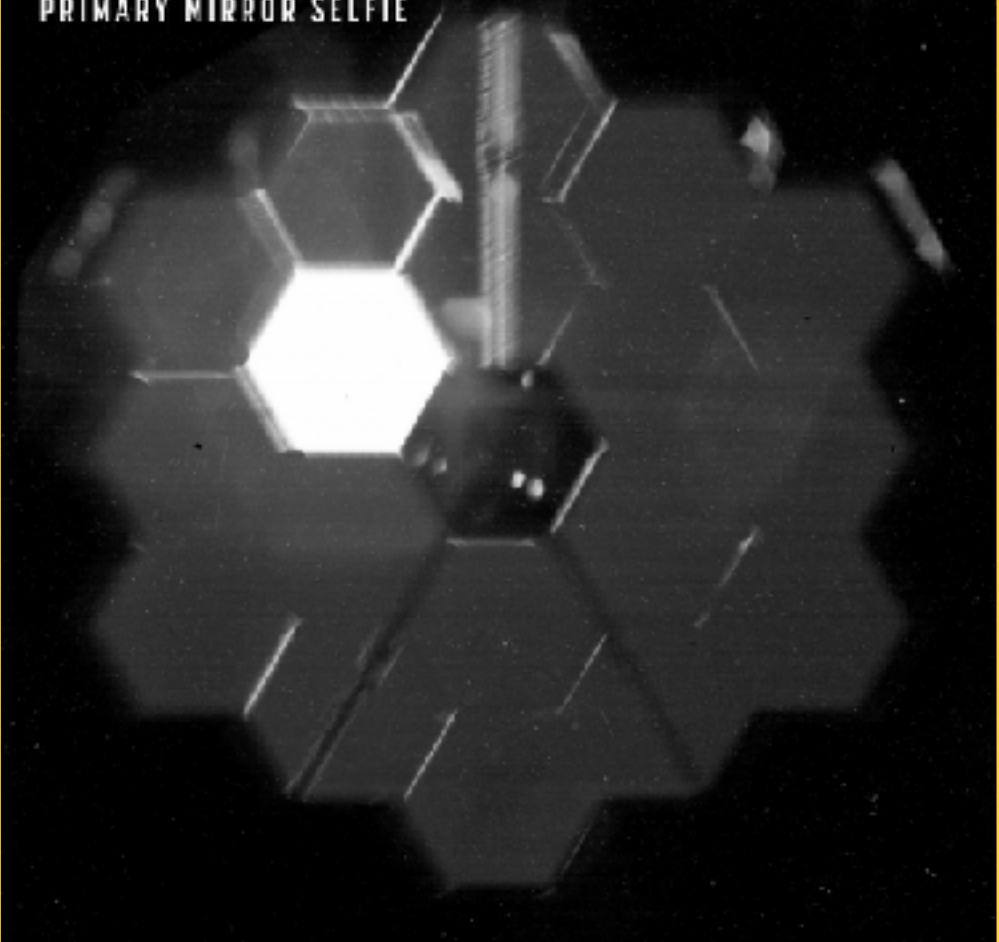
Inner Solar System



Enlarged 25x

Illustration

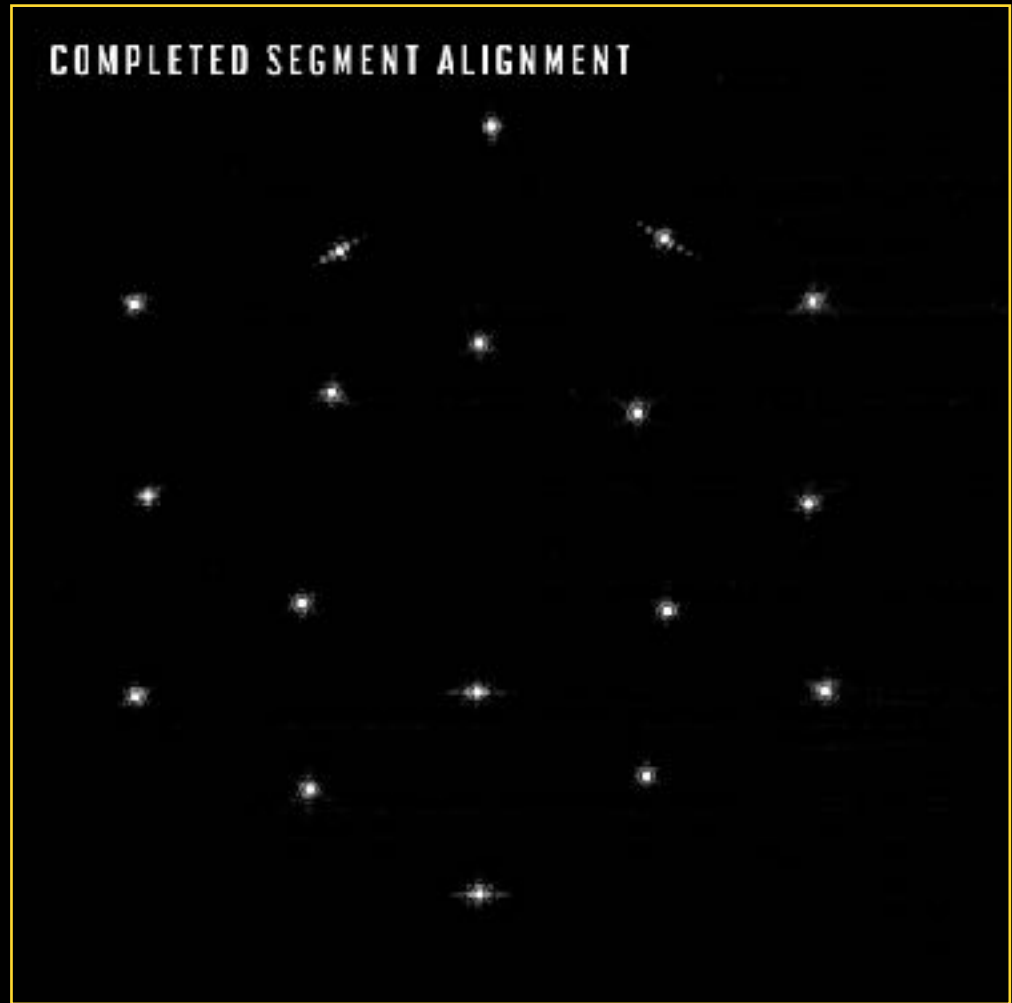
PRIMARY MIRROR SELFIE



INITIAL ALIGNMENT MOSAIC



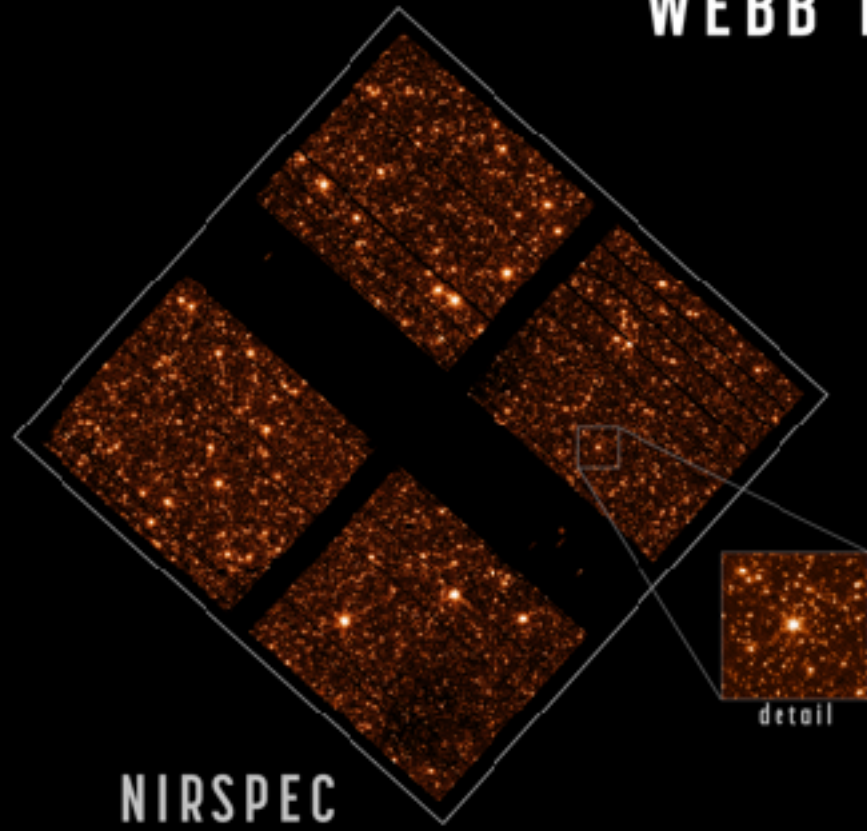
COMPLETED SEGMENT ALIGNMENT



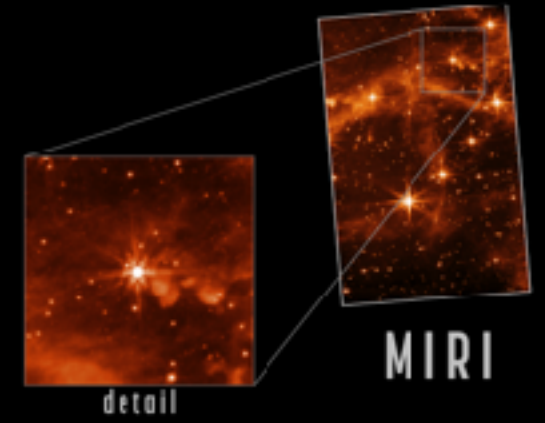
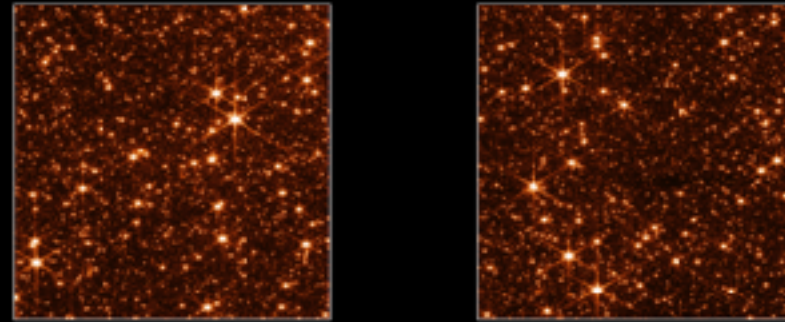
COMPLETED IMAGE STACKING



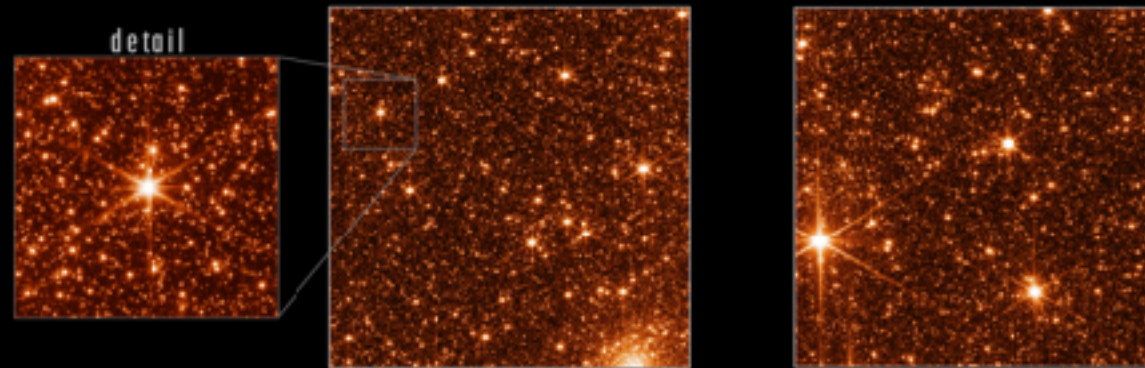
WEBB TELESCOPE IMAGE SHARPNESS CHECK



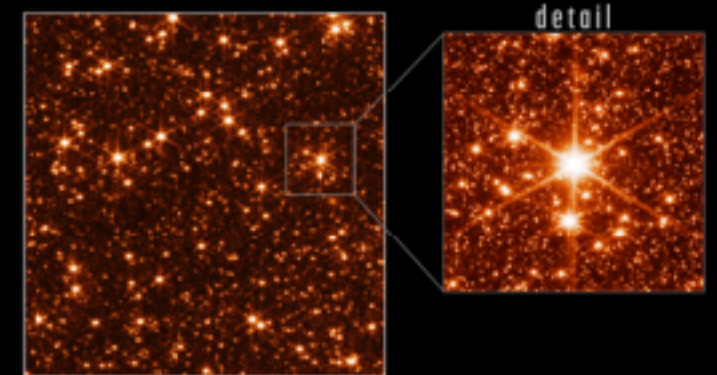
NIRCAM

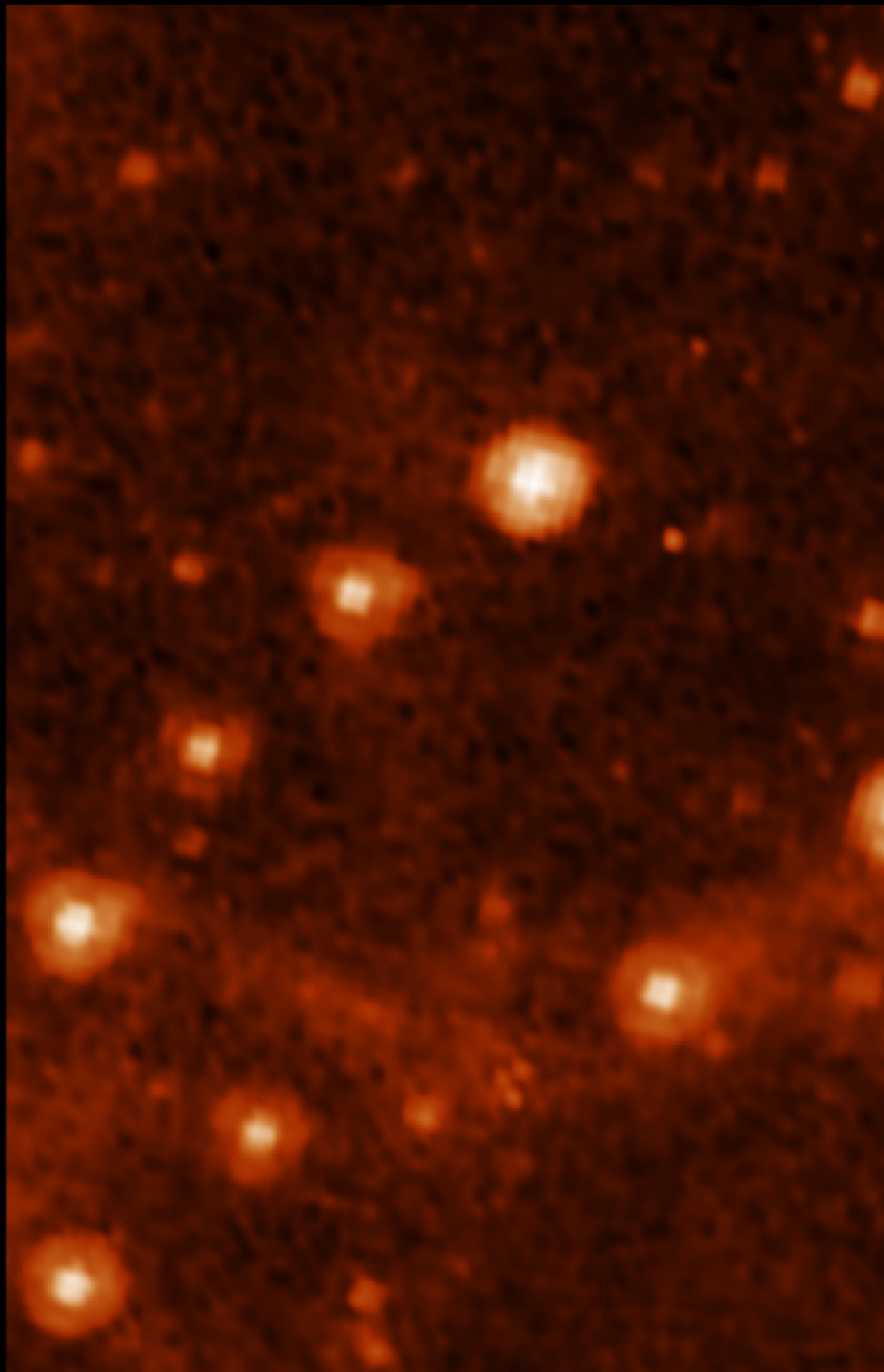


FINE GUIDANCE SENSOR



NIRISS





SPITZER IRAC 8.0 μ



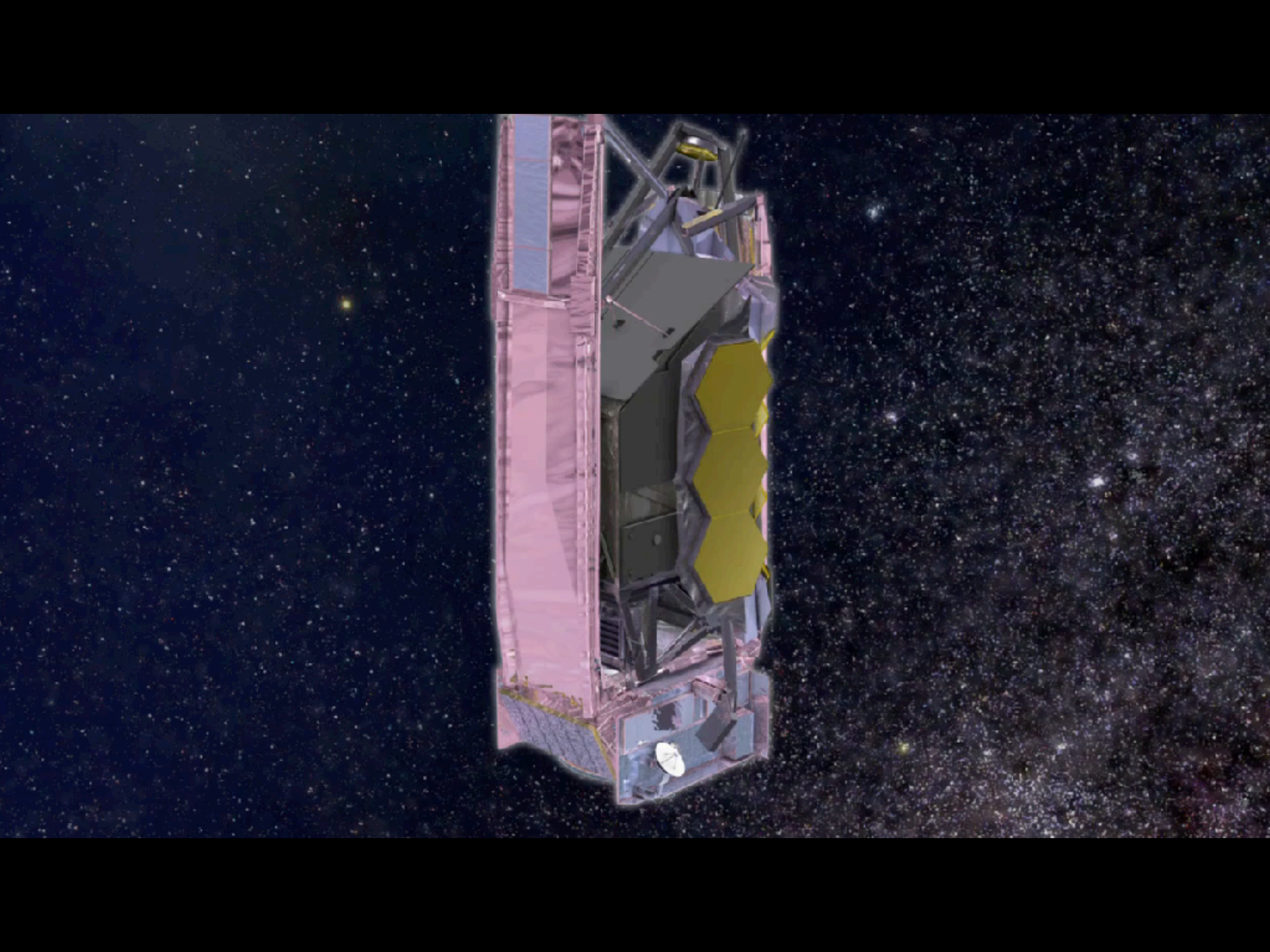
WEBB MIRI 7.7 μ

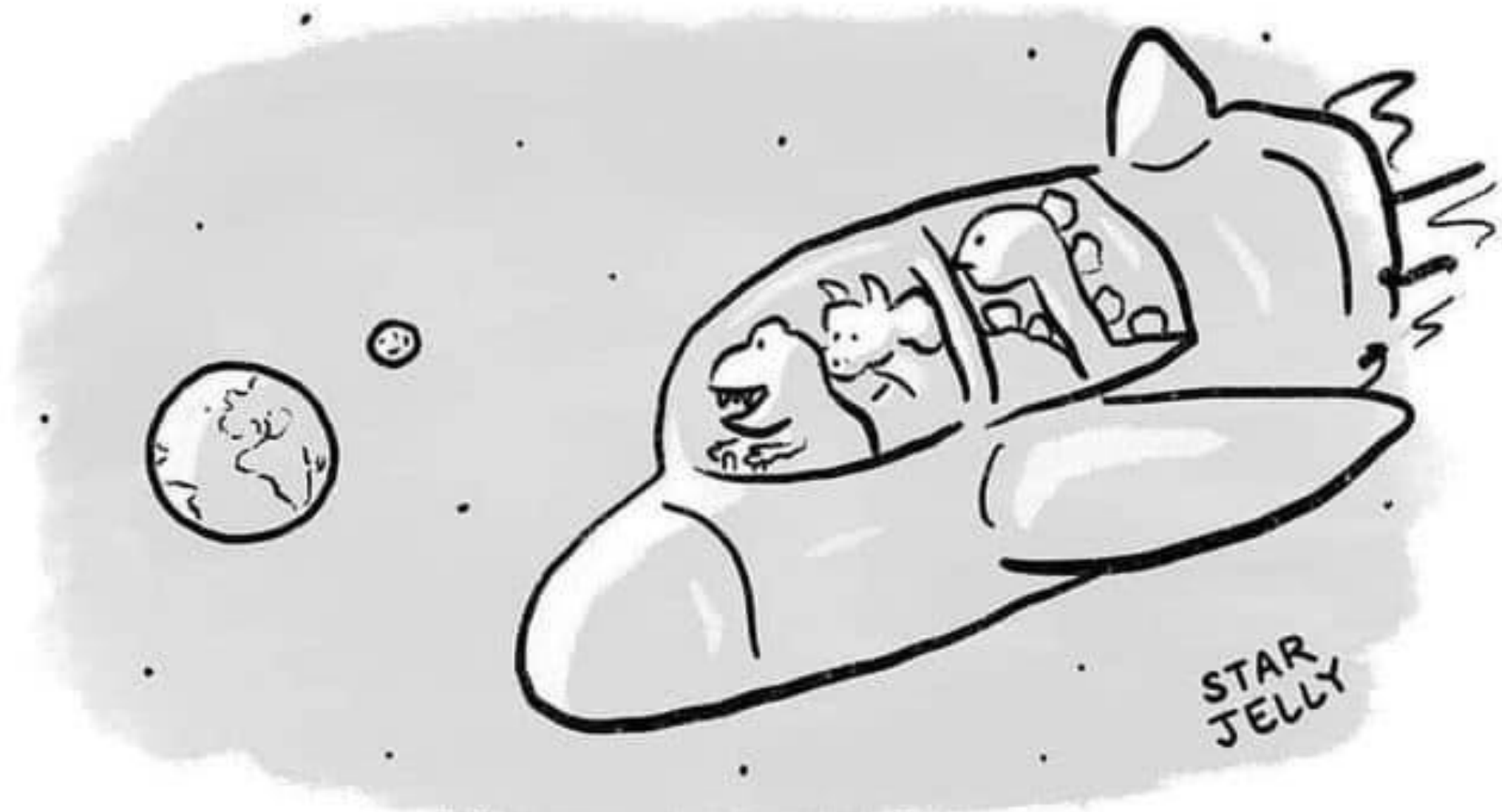
Závěrem...

- JWST byl vypuštěn 25.12. 2021
- všechny přístroje fungují nad očekávání dobře
- JWST bude dominovat astronomii příštích 10 let a určitě přinese spoustu nových poznatků a nečekaných objevů

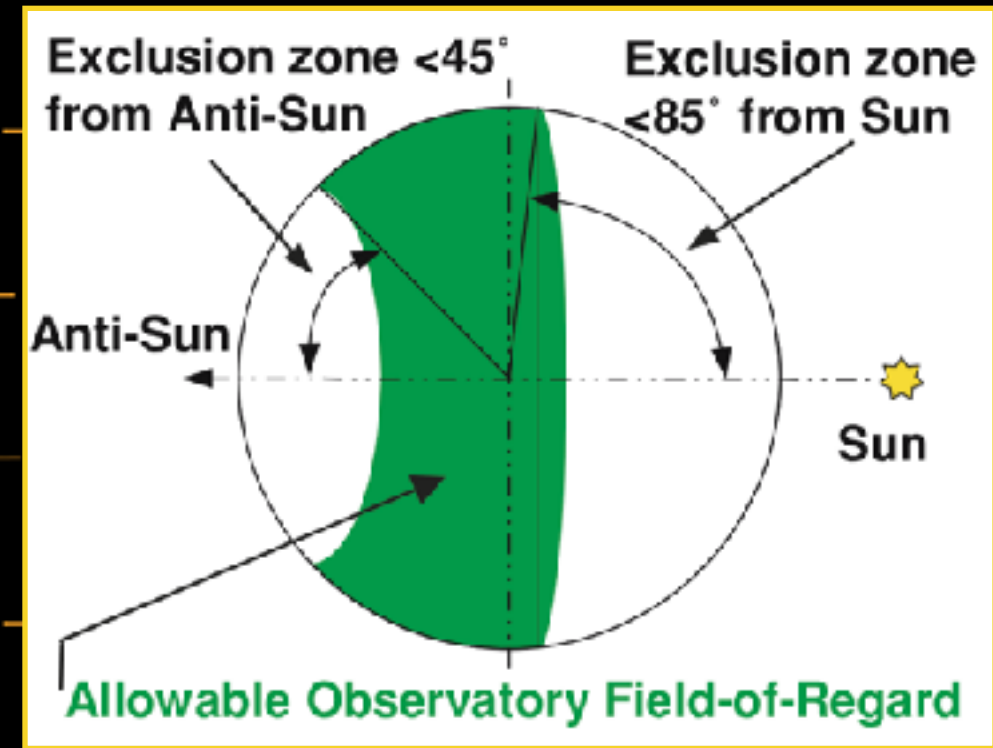
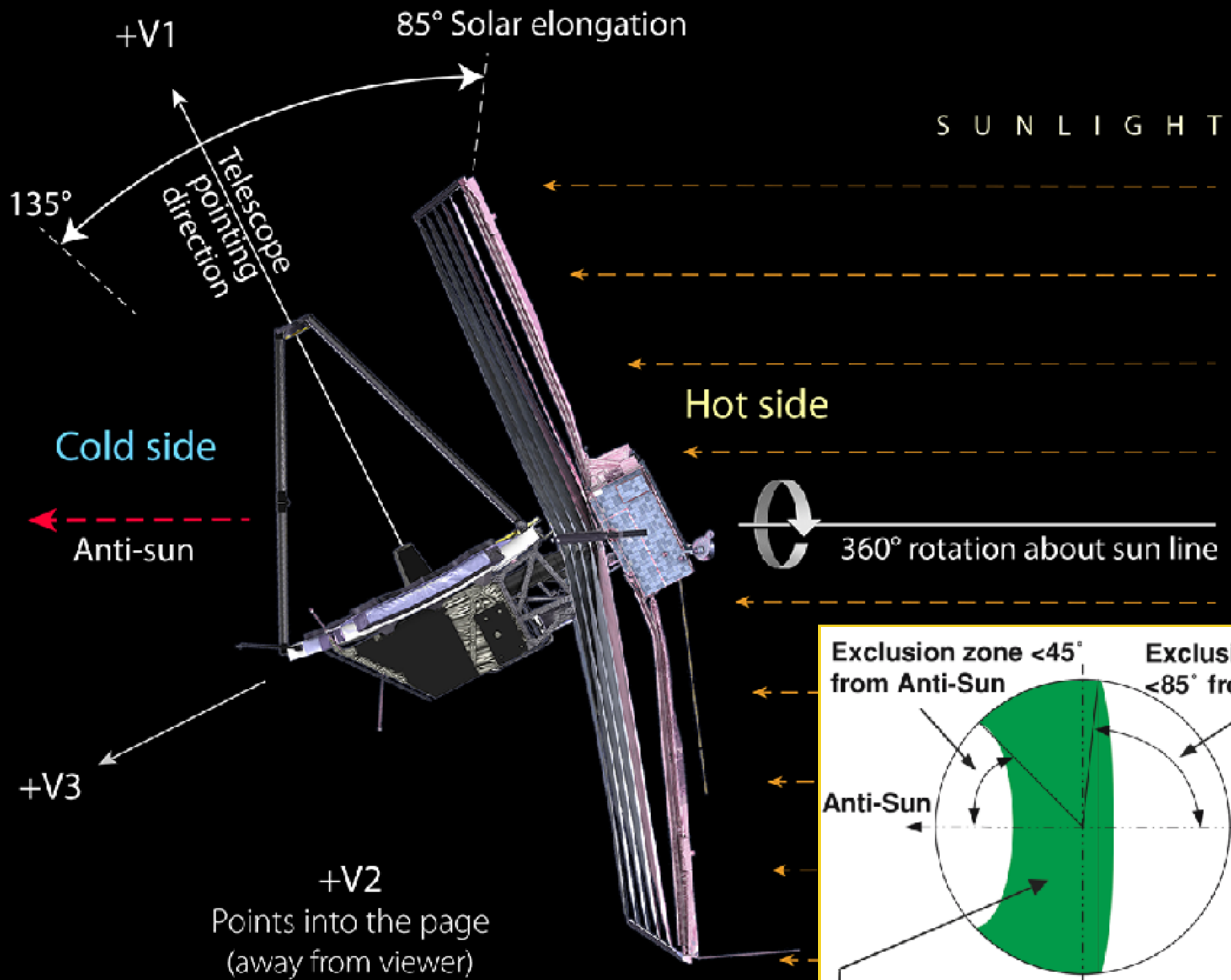
Díky!!!

<https://jwst.nasa.gov>



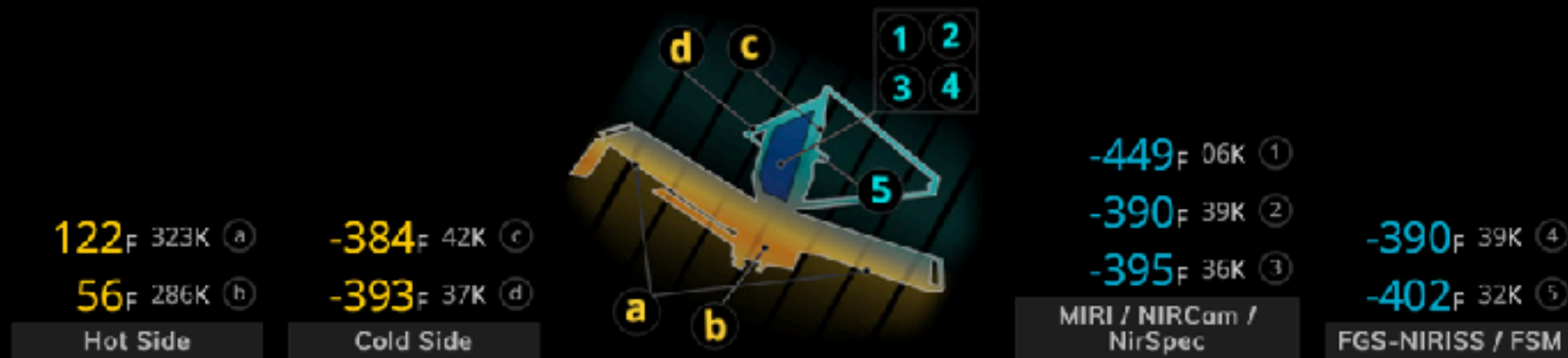


"Konečně doma, doufám, že opice mezitím neprovedly nic nepatřičného."



https://webb.nasa.gov/content/webbLaunch/whereIsWebb.html

Latest News: [Blog: Webb's 17 Instrument Modes](#) | [Teleconference: Replay from 5/9/22](#)



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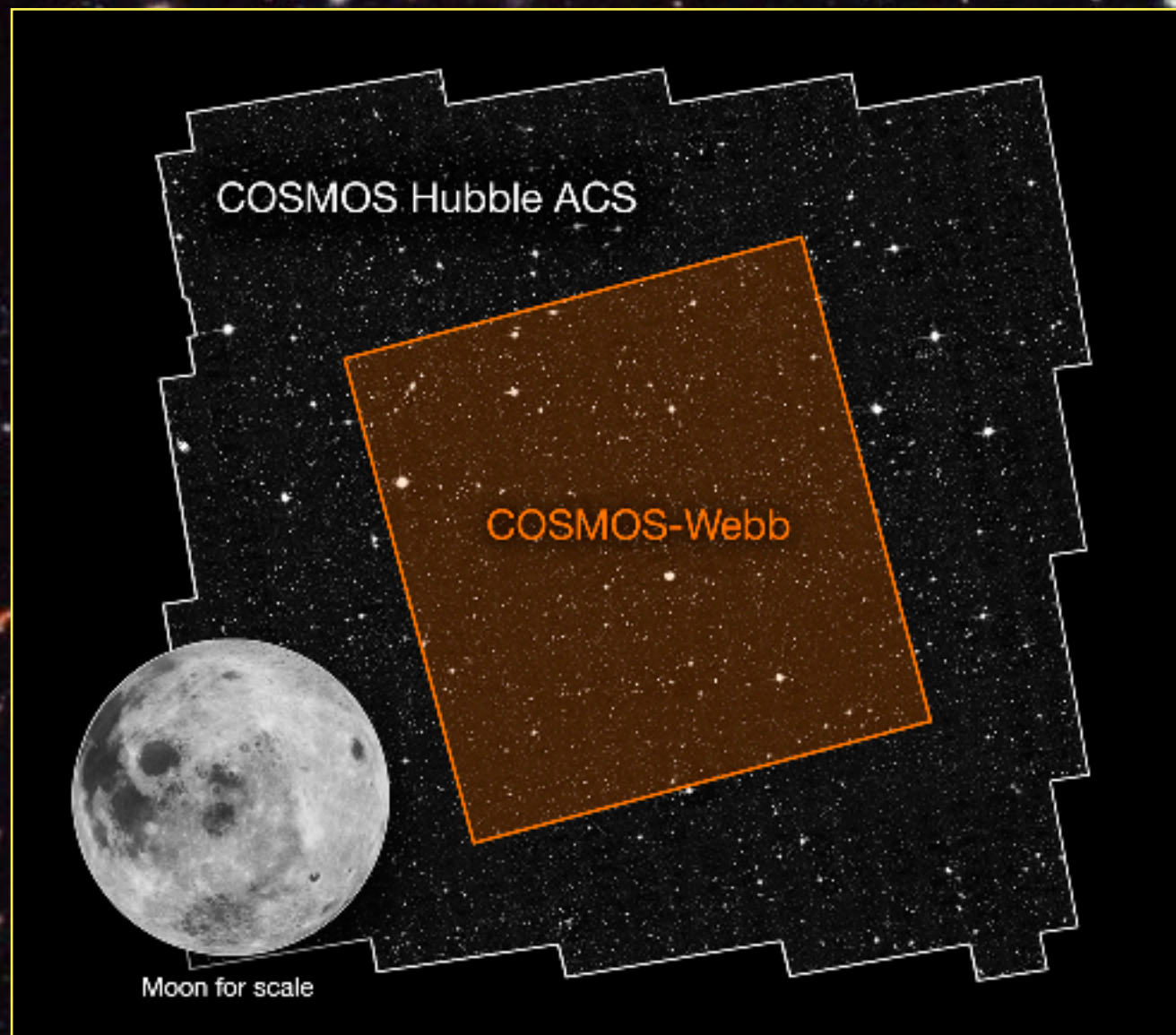
[About Temps](#)





MACS J0138 (HST) + sn2016jka, SN Type Ia, $z \sim 1.95$





Great Paris Exhibition Telescope
(lens at the same scale)
Paris, France (1900)

Yerkes Observatory
(40" refractor lens at the same scale)
Williams Bay, Wisconsin (1893)

Hooker (100")
Mt Wilson, California (1917)

Hale (200")
Mt Palomar, California (1948)

(1979-1998) **Multi Mirror Telescope**
Mount Hopkins, Arizona

BTA-6 (Large Altazimuth Telescope)
Zelenchuksky, Russia (1975)

Large Zenith Telescope
British Columbia, Canada (2003)

Gaia
Earth-Sun L2 point (2014)

Kepler
Earth-trailing solar orbit (2009)

James Webb Space Telescope
Earth-Sun L2 point (planned 2018)

Hubble Space Telescope
Low Earth Orbit (1990)



Tennis court at the same scale

Large Sky Area Multi-Object Fiber Spectroscopic Telescope
Hebei, China (2009)

Hobby-Eberly Telescope
Davis Mountains, Texas (1996)

Large Binocular Telescope
Mount Graham, Arizona (2005)

Very Large Telescope
Cerro Paranal, Chile (1998-2000)

Magellan Telescopes
Las Campanas, Chile (2000/2002)

Giant Magellan Telescope
Las Campanas Observatory, Chile (planned 2020)

Overwhelmingly Large Telescope
(cancelled)

Gran Telescopio Canarias
La Palma, Canary Islands, Spain (2007)

Southern African Large Telescope
Sutherland, South Africa (2005)

Very Large Telescope
Cerro Paranal, Chile (1998-2000)

Magellan Telescopes
Las Campanas, Chile (2000/2002)

Giant Magellan Telescope
Las Campanas Observatory, Chile (planned 2020)

Overwhelmingly Large Telescope
(cancelled)

Arecibo radio telescope at the same scale

Keck Telescope
Mauna Kea, Hawaii (1993/1996)

Gemini North
Mauna Kea, Hawaii (1999)

Gemini South
Cerro Pachón, Chile (2000)

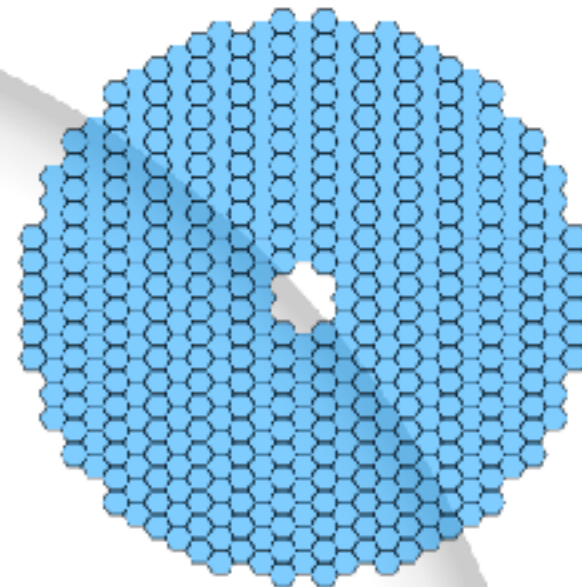
Large Synoptic Survey Telescope
El Peñón, Chile (planned 2020)

Overwhelmingly Large Telescope
(cancelled)

Giant Magellan Telescope
Las Campanas Observatory, Chile (planned 2020)

Arecibo radio telescope at the same scale

Subaru Telescope
Mauna Kea, Hawaii (1999)



Thirty Meter Telescope
Mauna Kea, Hawaii (planned 2022)

Gemini South
Cerro Pachón, Chile (2000)

Large Synoptic Survey Telescope
El Peñón, Chile (planned 2020)

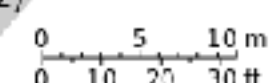
Overwhelmingly Large Telescope
(cancelled)

Giant Magellan Telescope
Las Campanas Observatory, Chile (planned 2020)

Arecibo radio telescope at the same scale

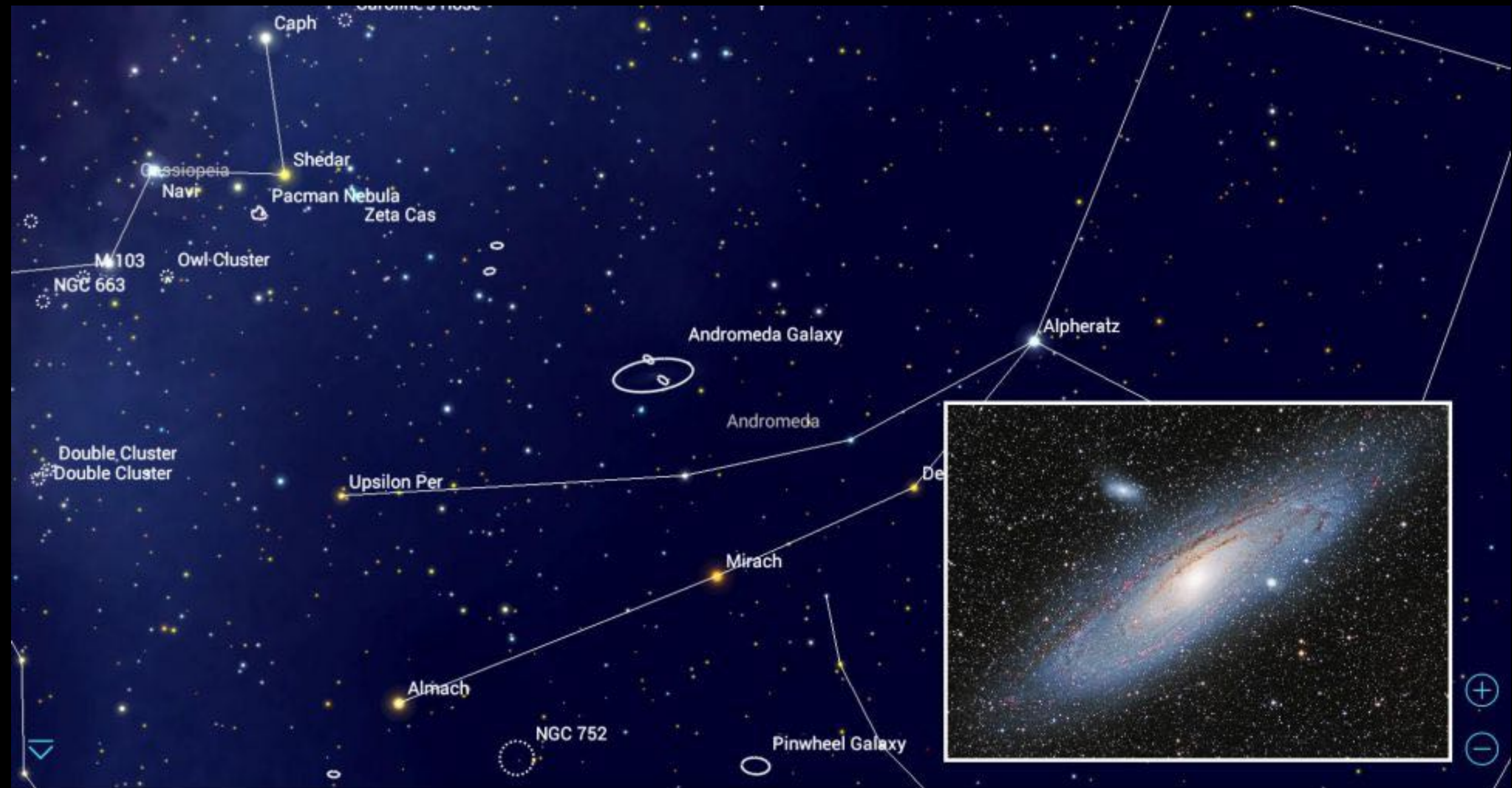
European Extremely Large Telescope
Cerro Armazones, Chile (planned 2022)

Human at the same scale



Basketball court at the same scale

M31 Andromeda Galaxy





0.000 billion years

