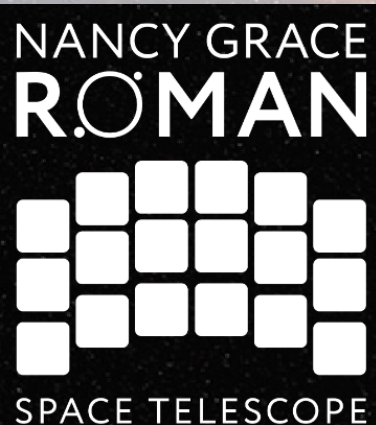


NASA's mission: exploring space using optics

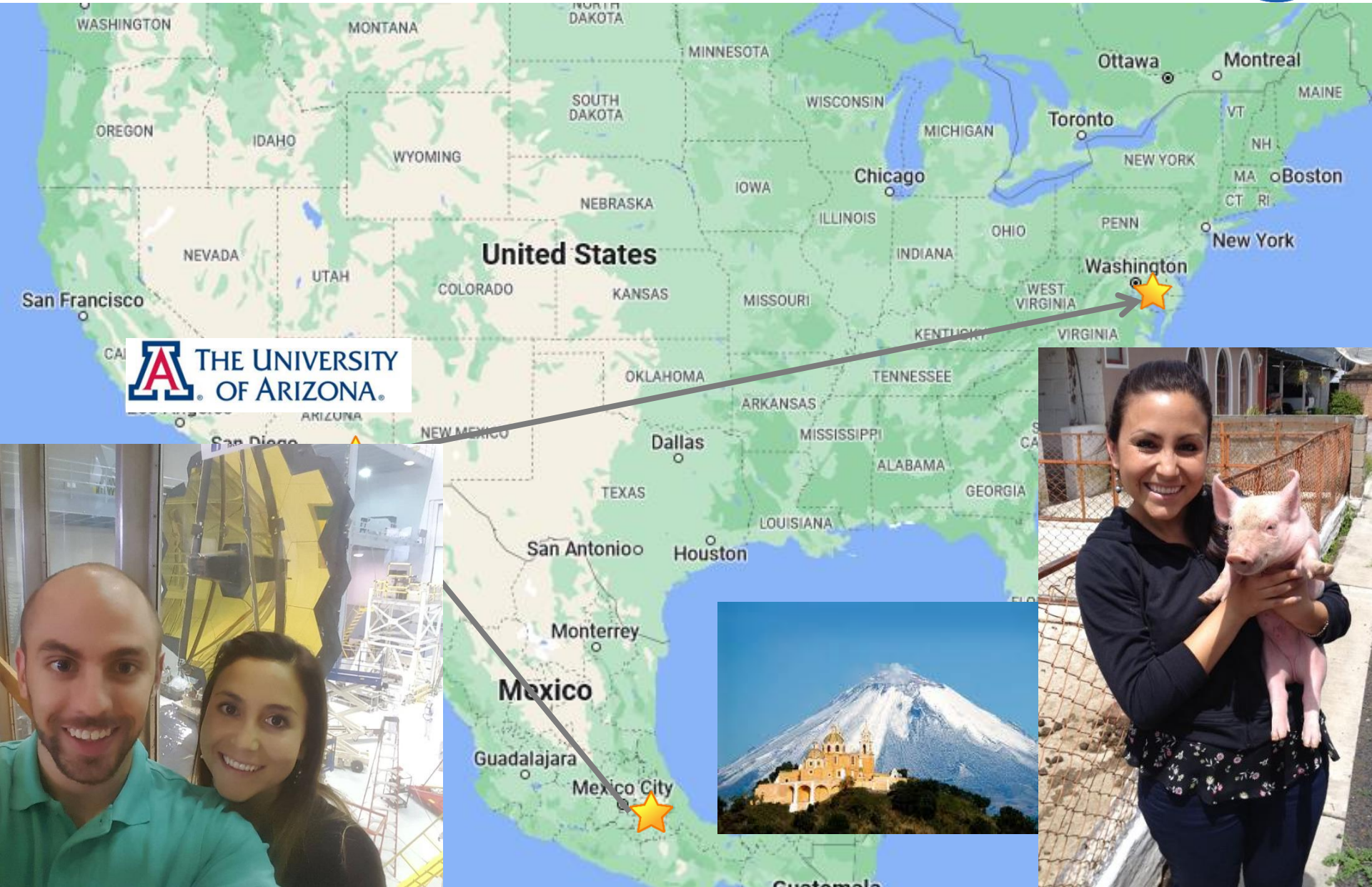
Margaret Z. Dominguez, Ph.D.
NASA Goddard Space Flight Center
OPTICA Ambassador

OPTICA technical group
February 28th, 2024

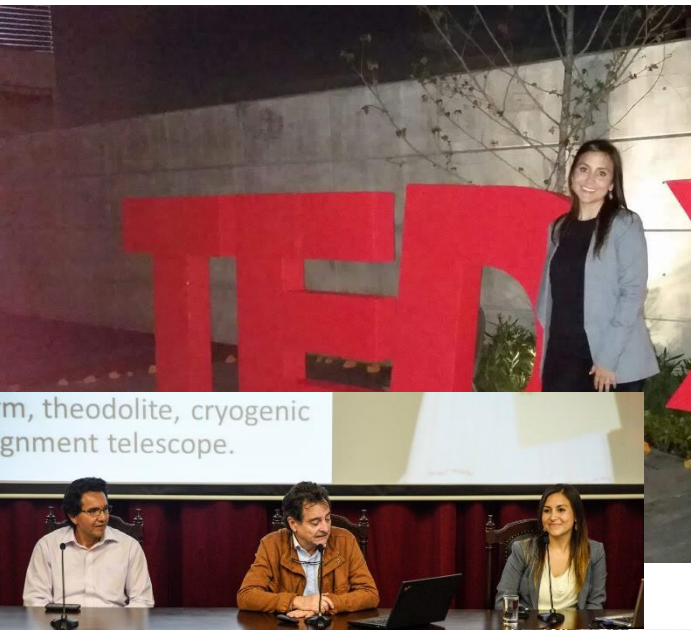




A little about my journey



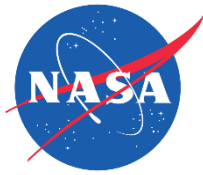
A little about my outreach efforts



2021 Ambassadors

 Lisa Adamu	 Linhui Yu	 Natalia Mysko-Krutik
 Barbano	 Grad Reshef	 Margaret Dominguez
 Da Ros	 Michael Williams	 Tatovik Chalyan





A little about my outreach efforts...

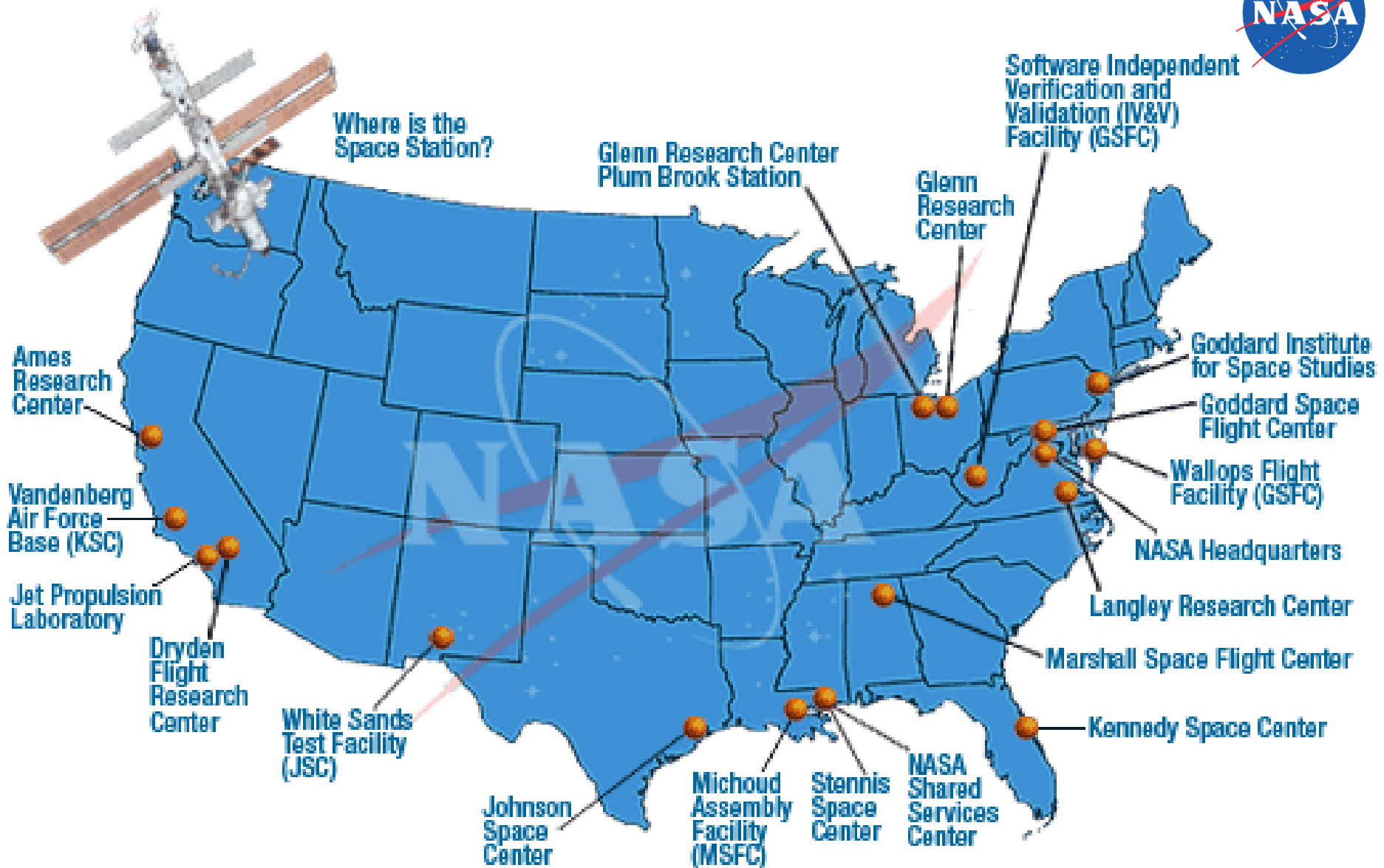
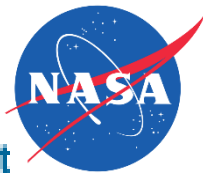


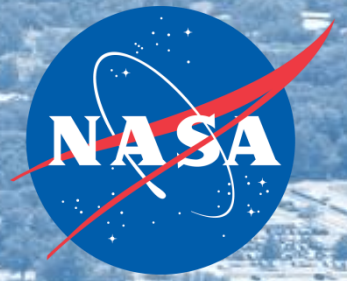
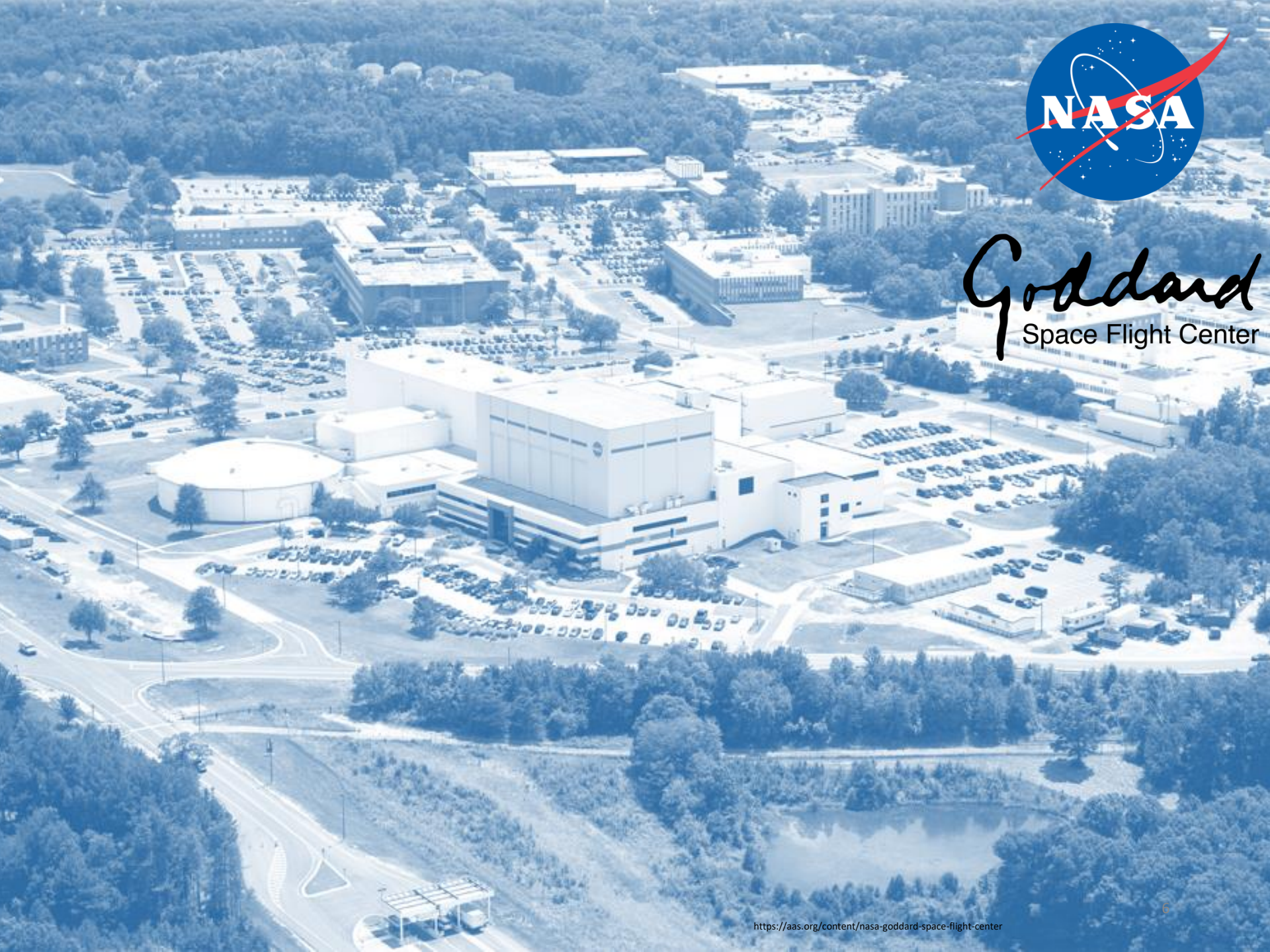
TECHNOLOchicas



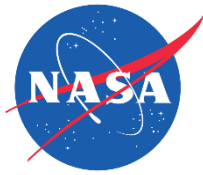

National Girls Collaborative Project

Connect, create, and collaborate to transform STEM for all youth.





Goddard
Space Flight Center



NASA Goddard Space Flight Center

Science Fields

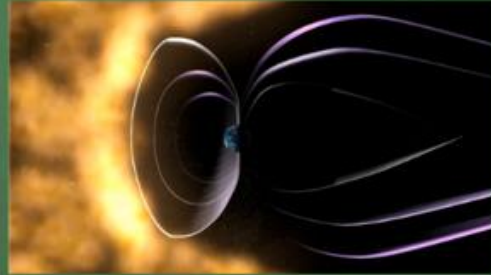
Earth Science



Astrophysics



Heliophysics



Planetary



Astrophysics

Decadal Survey Missions

1990



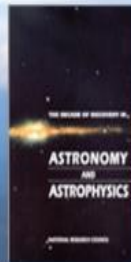
1972
Decadal Survey
Hubble

1999



1982
Decadal Survey
Chandra

2003



1991
Decadal Survey
Spitzer

2021



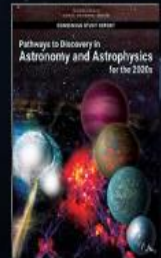
2001
Decadal Survey
Webb

2027



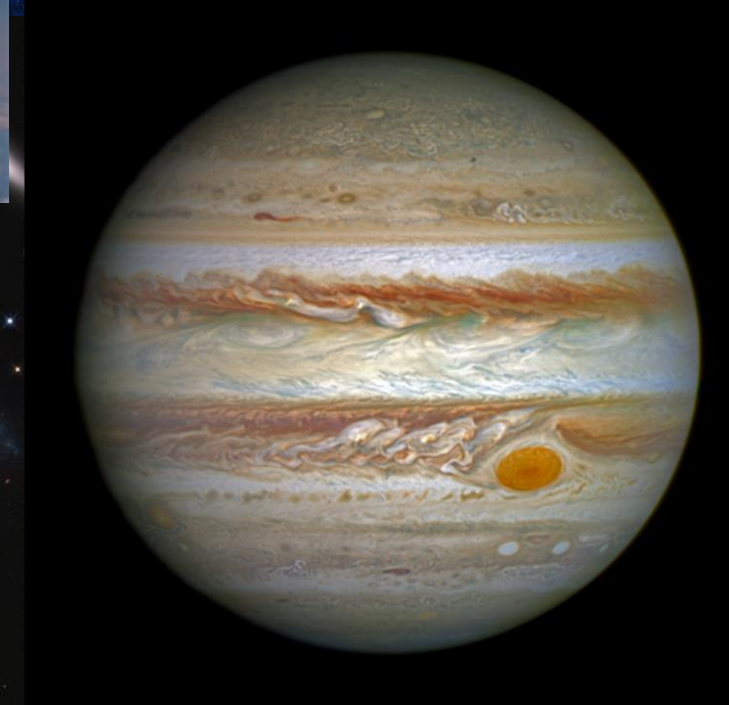
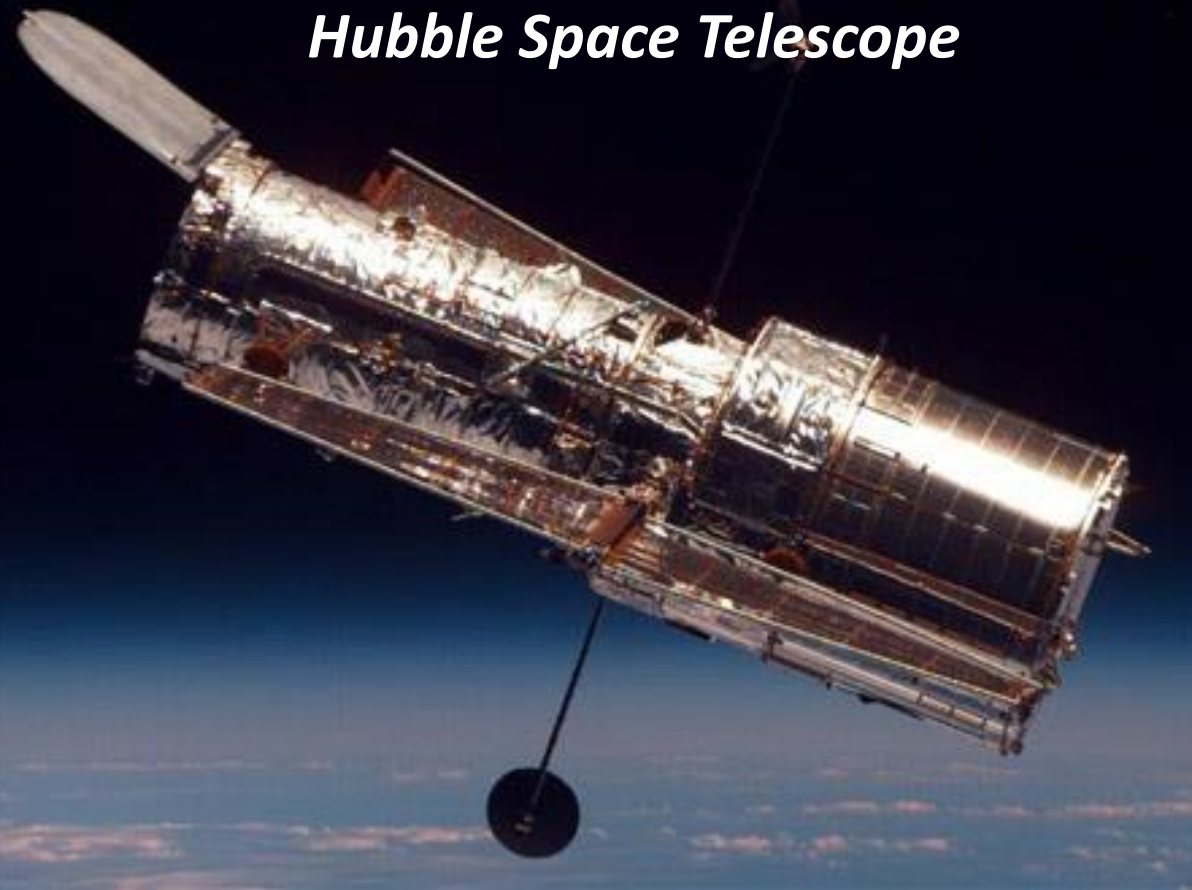
2010
Decadal Survey
Roman

204?

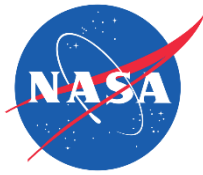


2021
Decadal Survey
HWO

Hubble Space Telescope

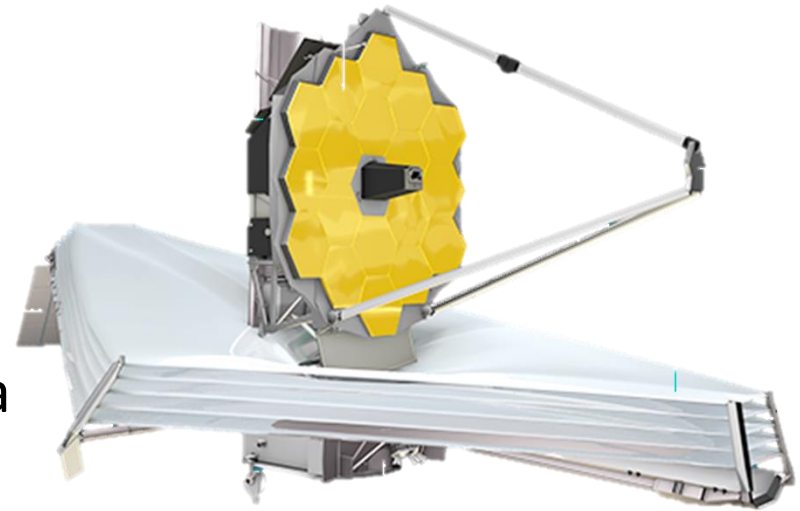


Webb Space Telescope overview

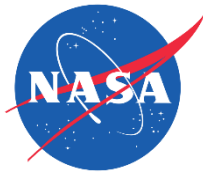


The Webb Space Telescope is an IR
NASA observatory:

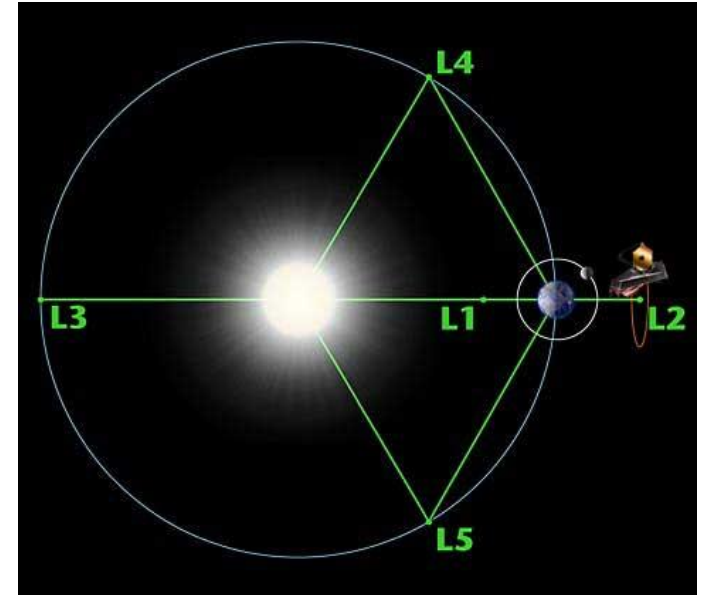
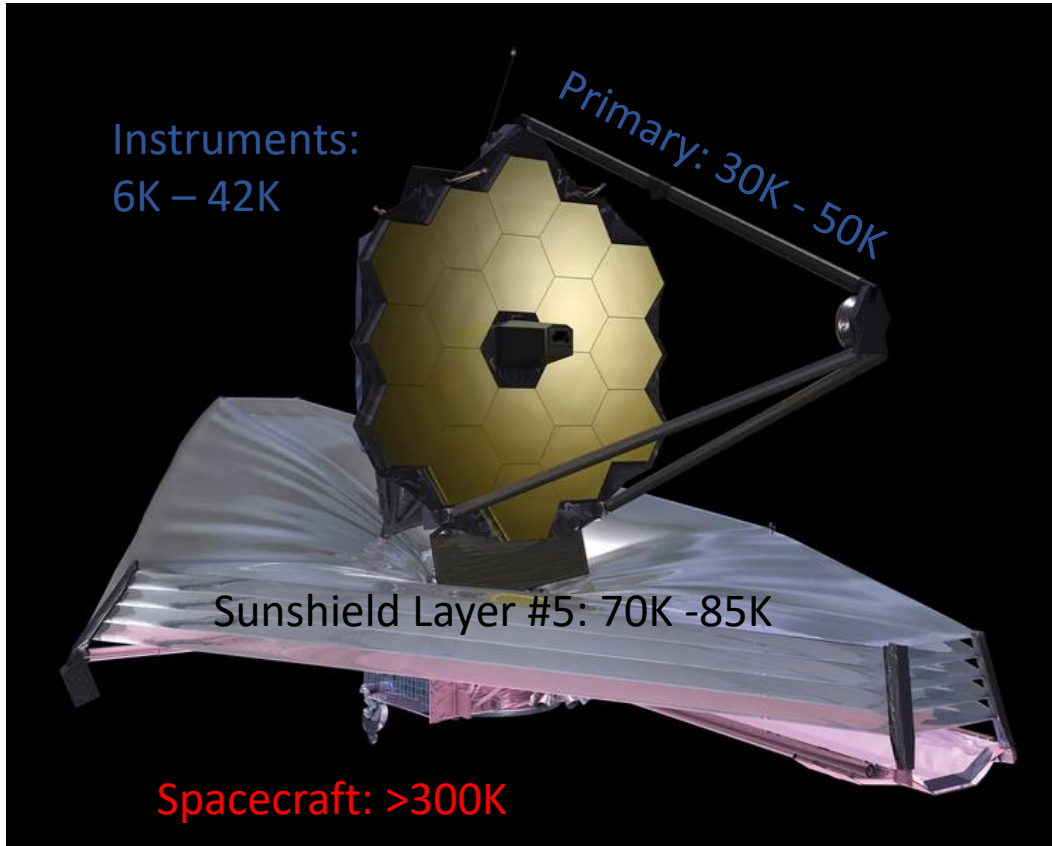
- 6.5 m telescope
- Launched in 2021
- Designed for at least 5 years, with a goal of 10 years
- Four instruments:
 - Near-Infrared Camera or NIRCam
 - Near-Infrared Spectrograph or NIRSpec
 - Mid-Infrared Instrument or MIRI
 - Fine Guidance Sensor/Near InfraRed Imager and Slitless Spectrograph



Webb Space Telescope temperature



$$0\text{ K} = -459^\circ\text{ F} = -273^\circ\text{ C}$$

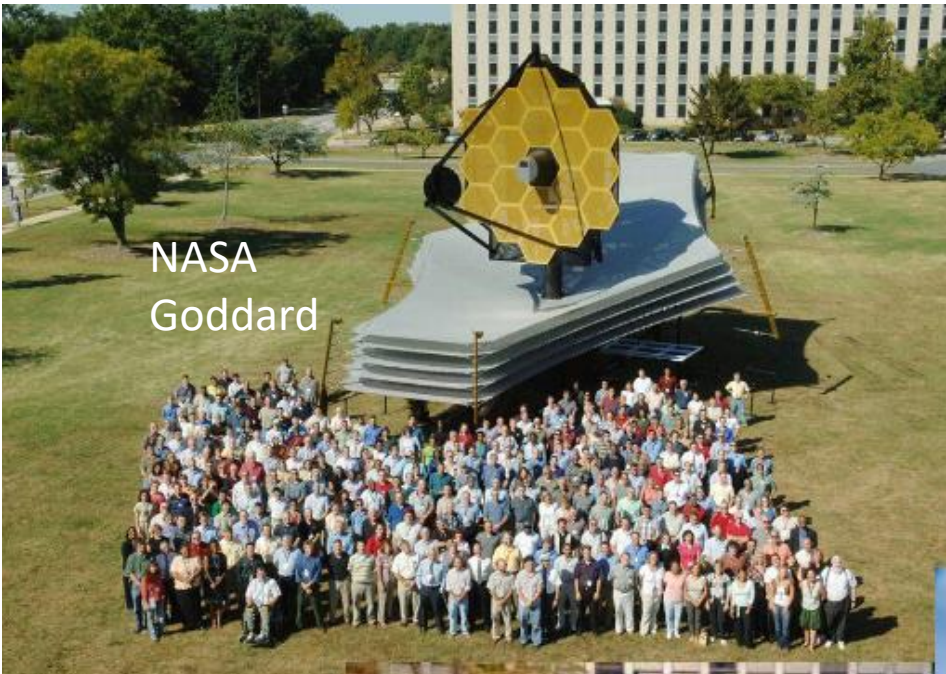
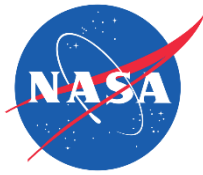


Located at L2
behind the sunshield

Sunshield
protection: SPF
of ~ 1.2 million



Webb Space Telescope people



NASA
Goddard



Ireland

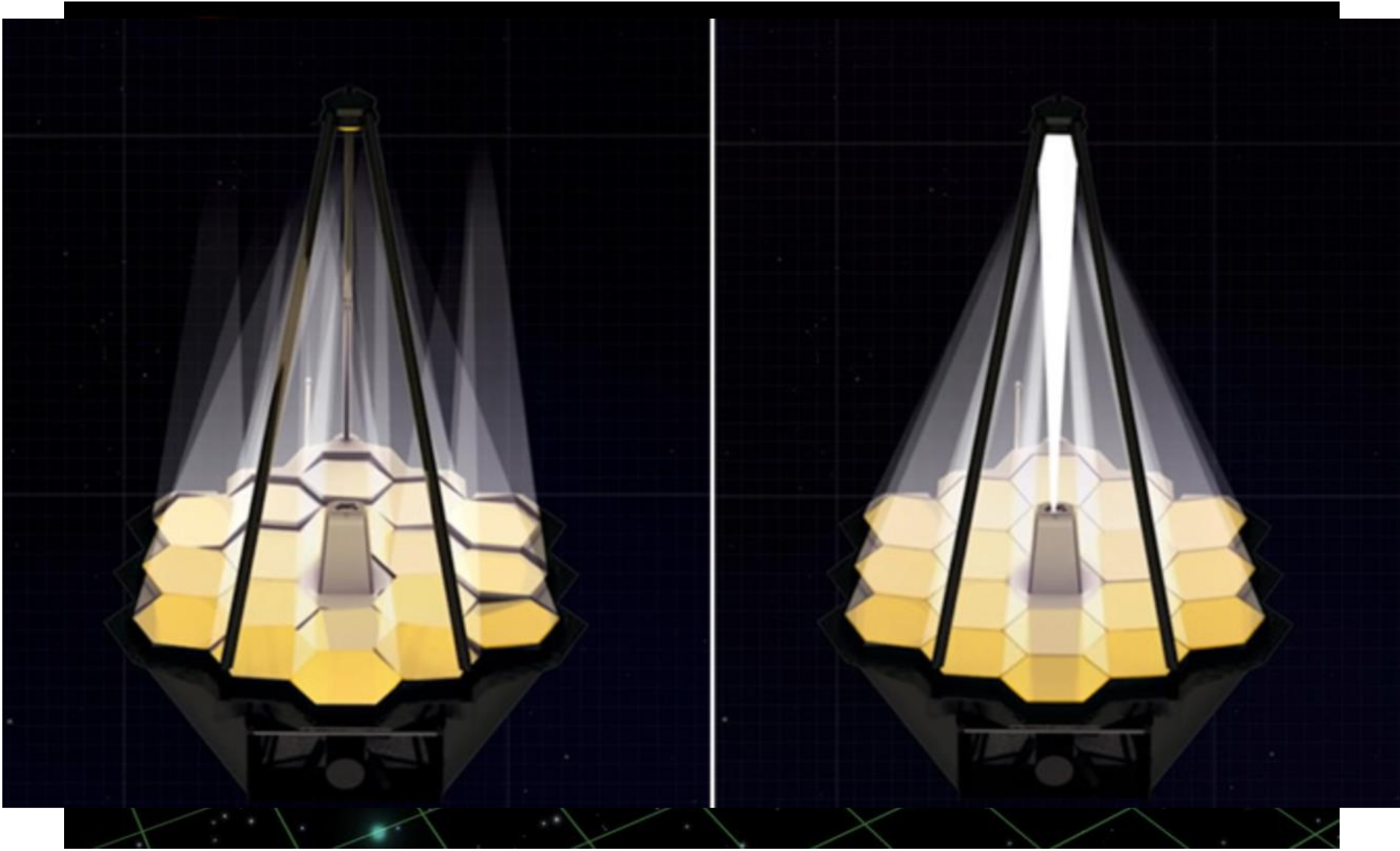
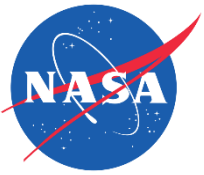


Munich



Baltimore

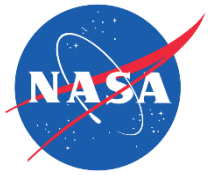
Webb Space Telescope timeline



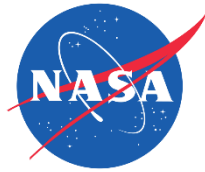
Webb Space Telescope first images



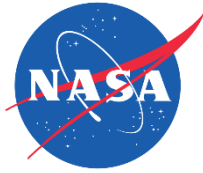
Hubble vs Webb



Nancy Grace Roman Space Telescope

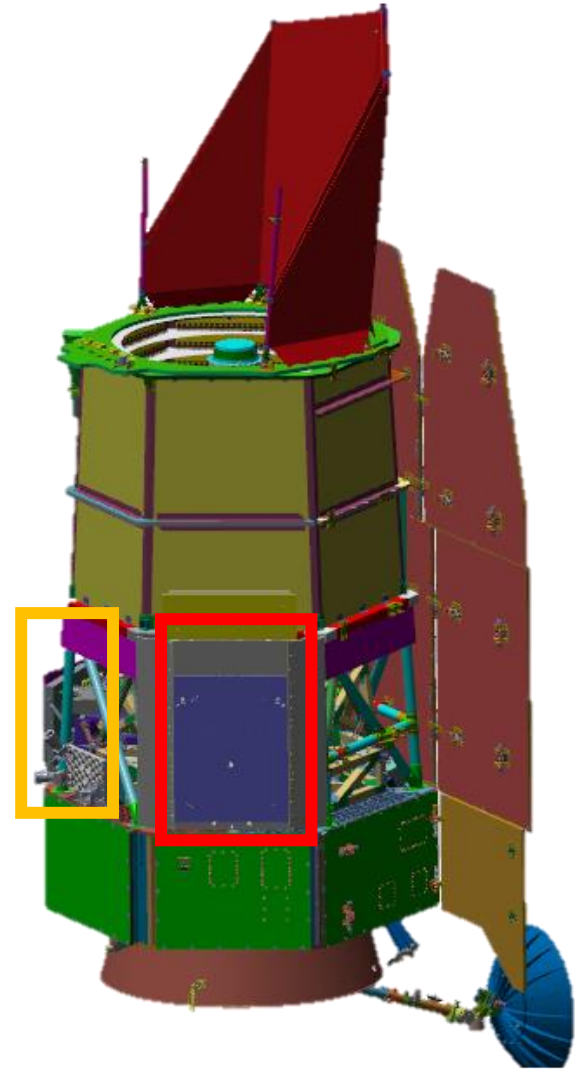


Roman Space Telescope overview

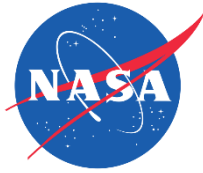


The Roman Space Telescope is a NASA observatory:

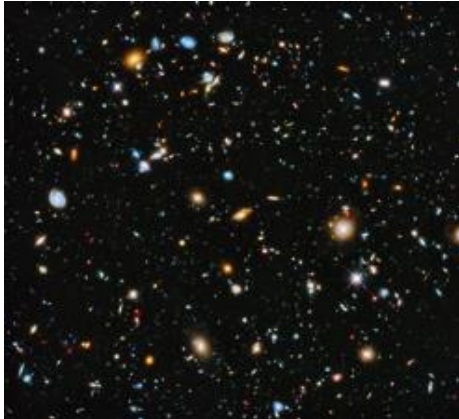
- 2.4m telescope.
- Launch in 2027.
- 5 year primary mission, with a potential 5 year extension.
- Two instruments:
 - Wide Field Instrument
 - Coronagraph Instrument



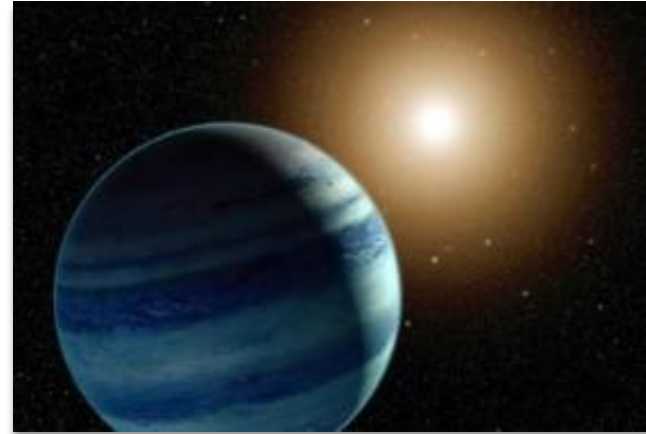
Roman Space Telescope mission



Dark Energy



Exoplanets



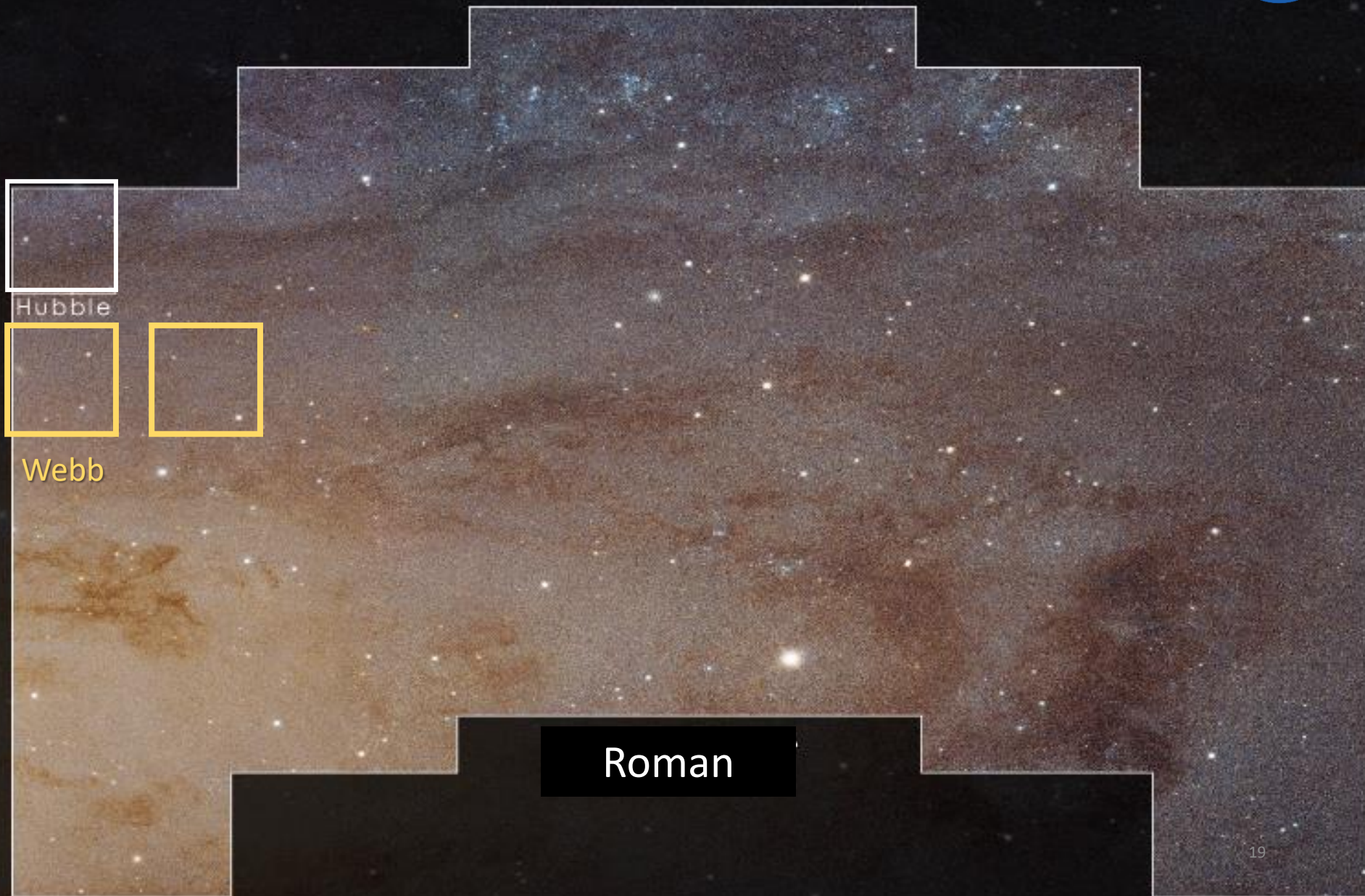
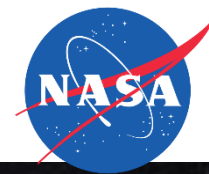
Science Objectives

- Use different methods to determine cosmic expansion history
- Test theories of accelerated expansion including Dark Energy
- Expand census of exoplanets (> Mars Mass)
- Conduct Near Infrared (NIR) imaging and spectroscopic surveys
- General Observer Program

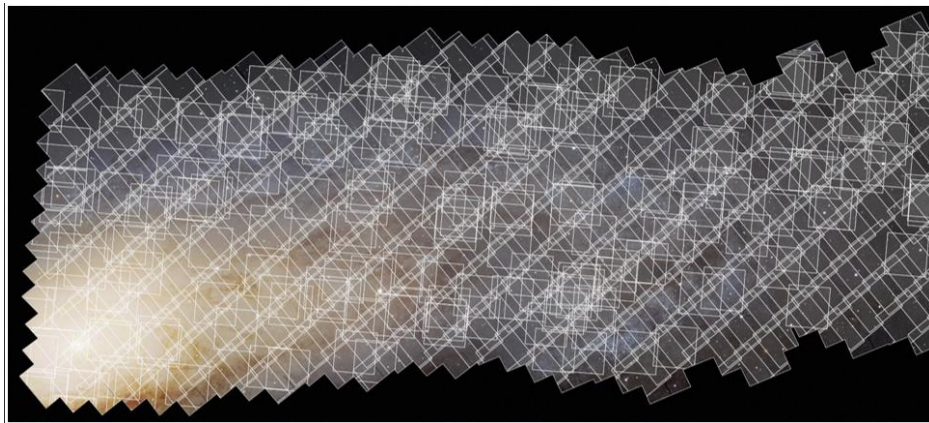
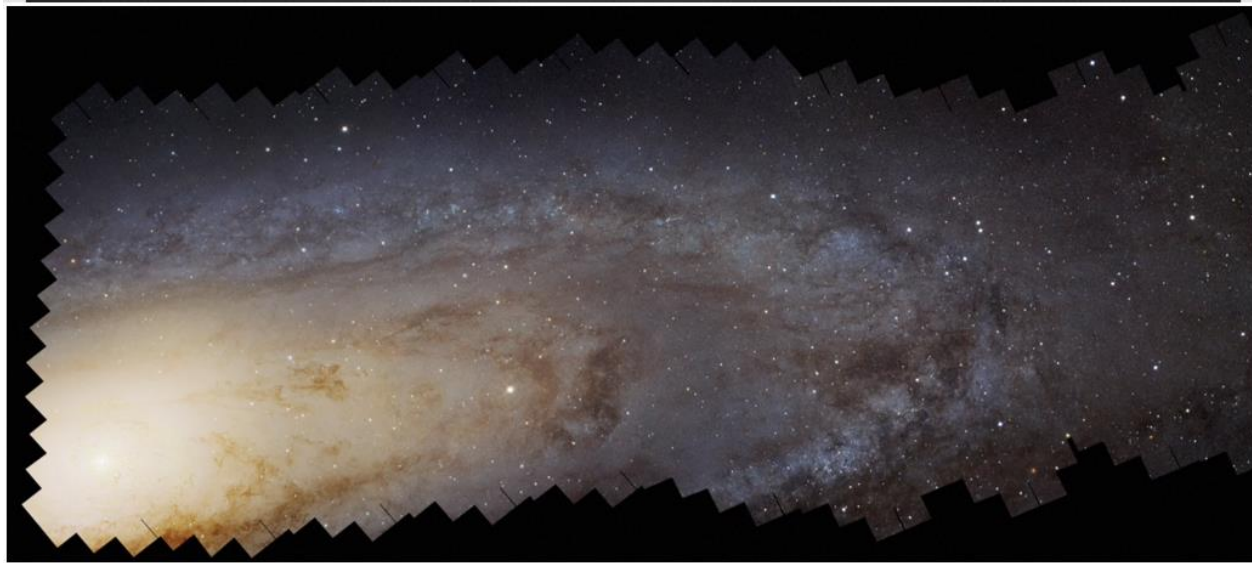
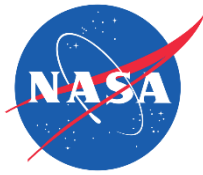
Technology Demonstration Objective

- Demonstrate exoplanet coronagraphy with active wavefront control

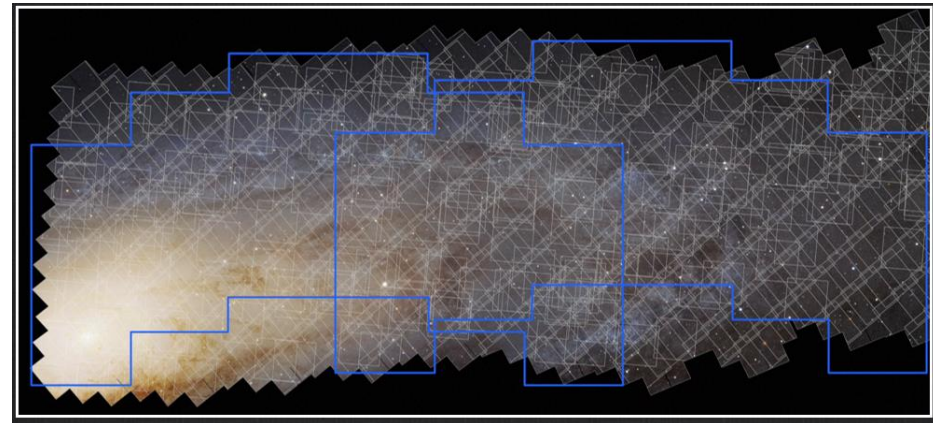
Roman Space Telescope FOV



Roman Space Telescope FOV: Andromeda galaxy



Hubble: 400+ individual pointings

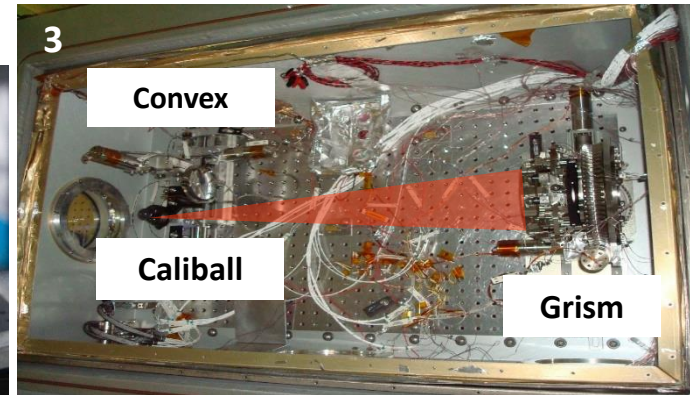
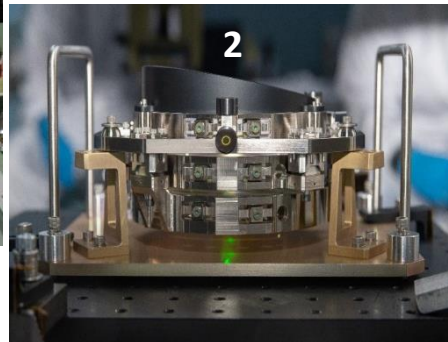
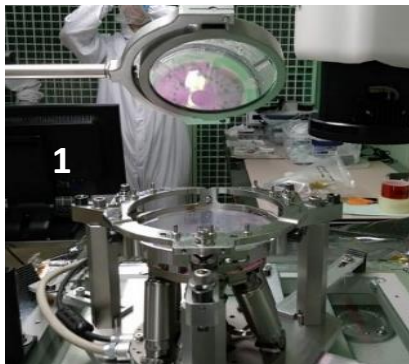
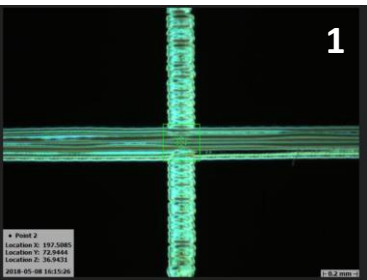
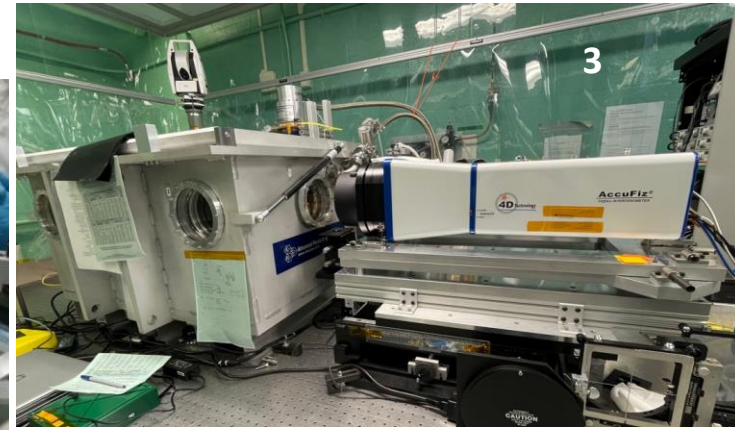
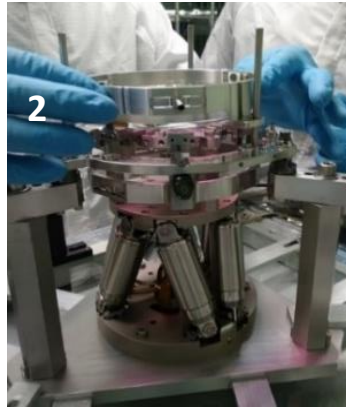
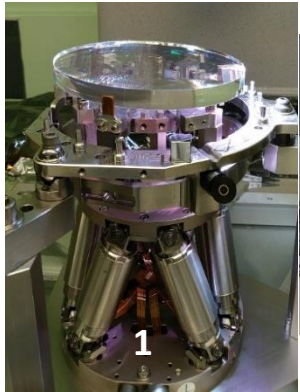


Roman: 2 individual pointings

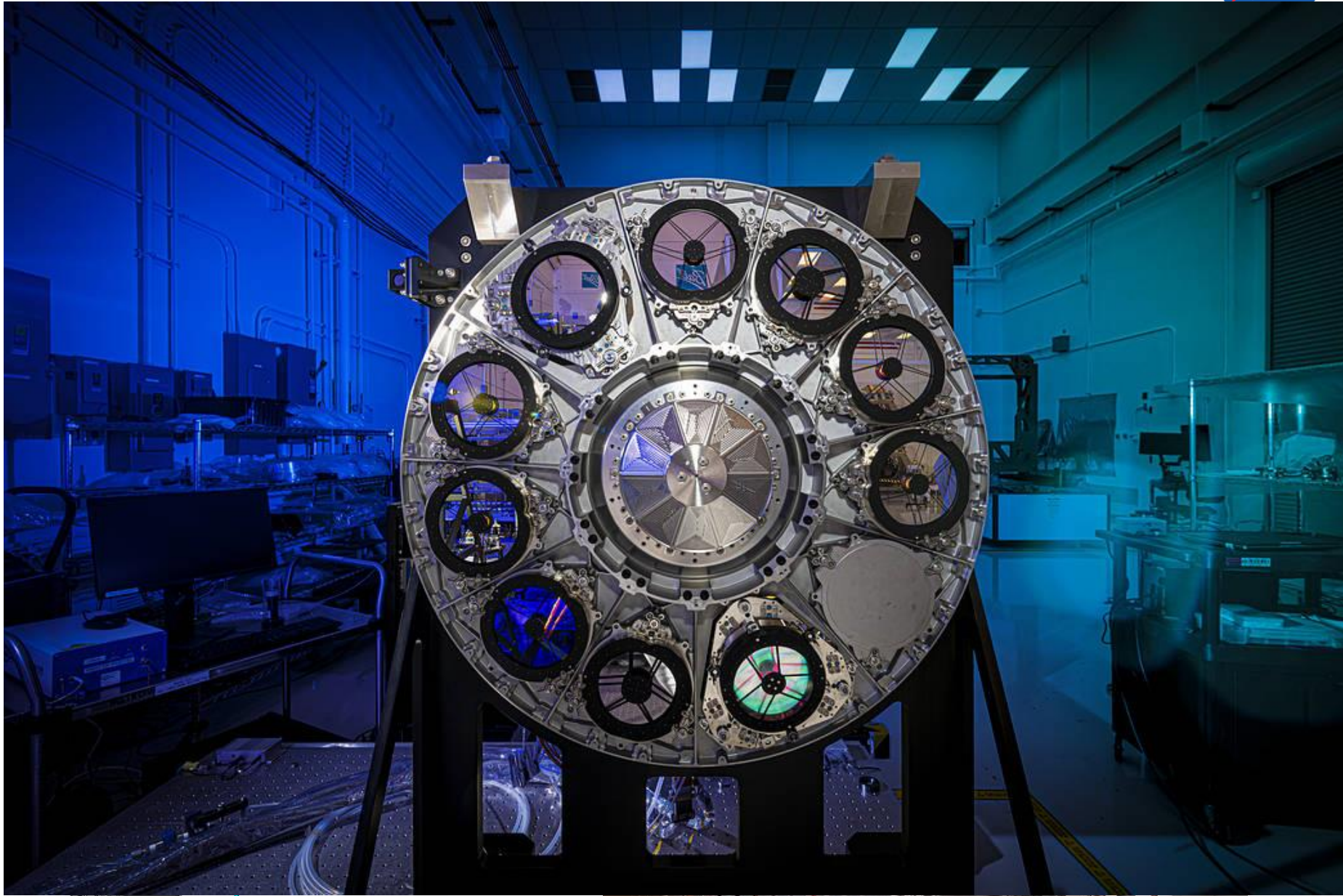
Optical Alignment, Integration and Testing

Grism Example

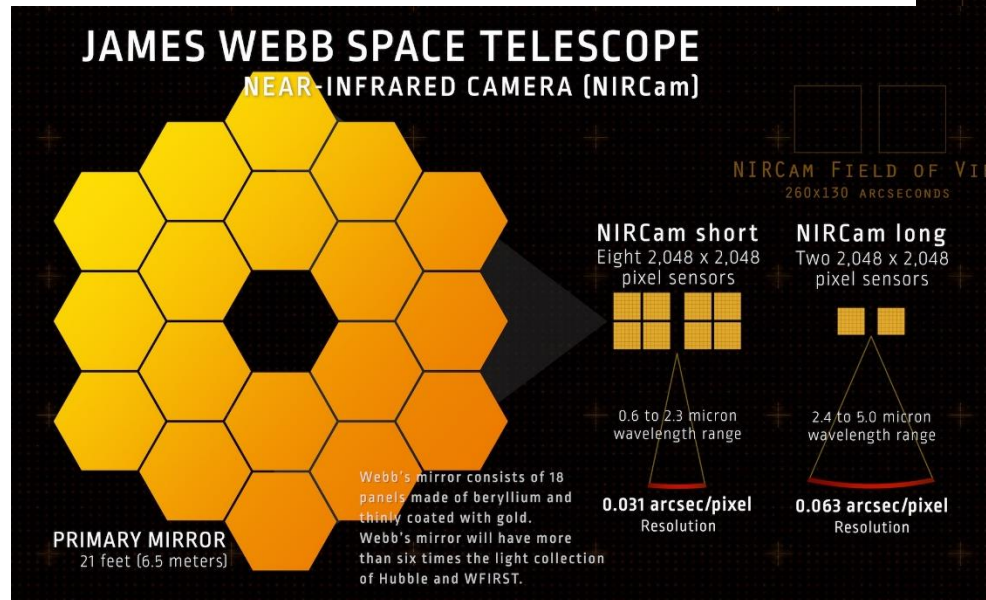
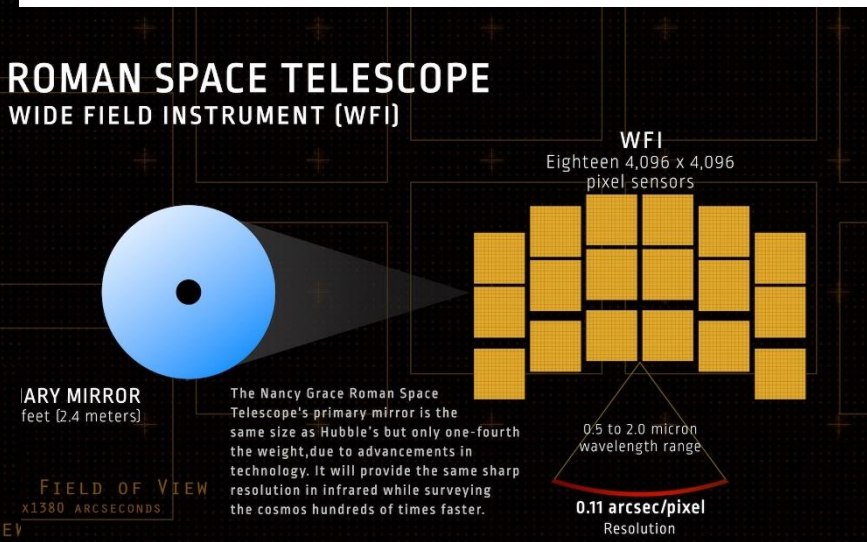
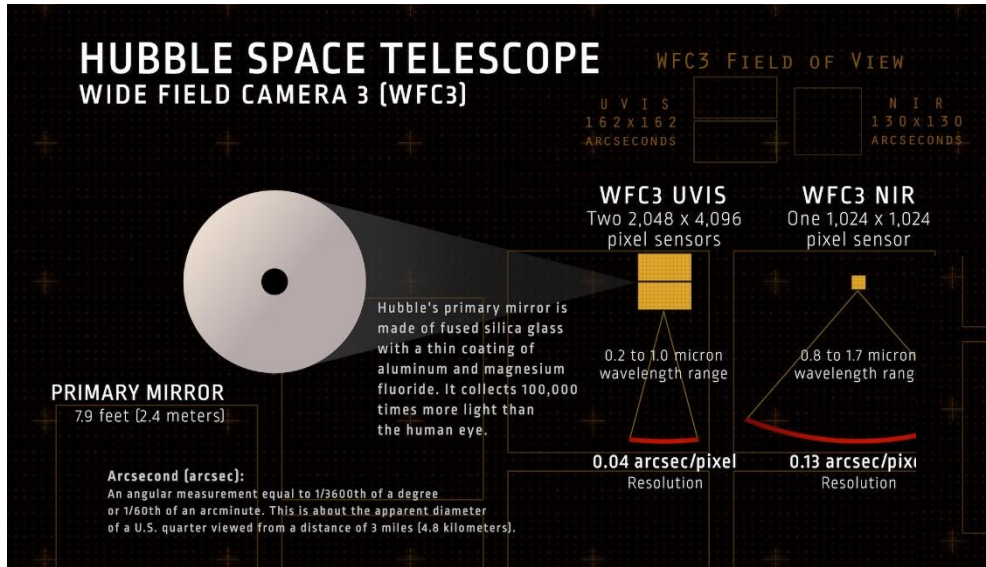
1. **Align** it using various tools and fiducials
2. **Integrate** element to element
3. **Test** optical performance using various instruments (depending on requirements)

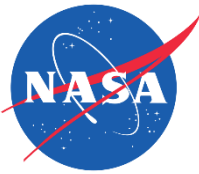


Roman Space Telescope WFI



Telescope comparison





Life is not easy for any of us.

But what does it matter?

*We must be perseverant and, above all,
have confidence in ourselves.*

Marie Curie