

**webb**

**LAUNCH KIT**

**#WebbSeesFarther**

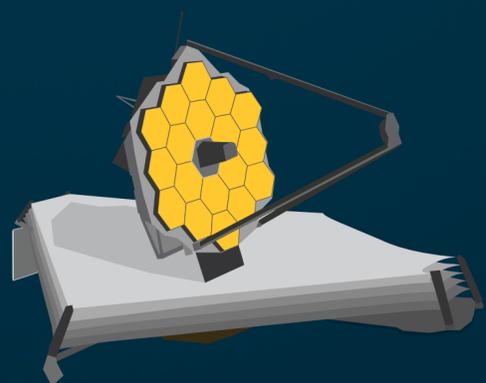


## WEBB: SEEING FARTHER

The James Webb Space Telescope (Webb) will be the largest, most powerful telescope ever launched into space. It follows in the footsteps of the Hubble Space Telescope as the next great space science observatory, designed to answer outstanding questions about the Universe and to make breakthrough discoveries in all fields of astronomy.

Webb will reveal the hidden Universe to our eyes: stars shrouded in clouds of dust, molecules in the atmospheres of other worlds, and light from the first stars and galaxies. With its suite of state-of-the-art instruments, Webb will push the frontiers of our knowledge of the Solar System, of how stars and planets form, and of galaxy formation and evolution, in new ways.

The telescope will launch on an Ariane 5 rocket from Europe's Spaceport in French Guiana. From there it embarks on a month-long journey to its destination orbit around the second Lagrange point (L2), about one and a half million kilometres from Earth. In the first month after launch, Webb will unfold its sunshield, which is the size of a tennis court, and then deploy its 6.5-metre primary mirror that can detect the faint light of distant stars and galaxies with a sensitivity a hundred times greater than that of Hubble.



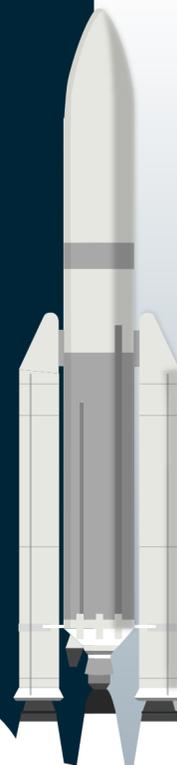
## ABOUT THIS MEDIA KIT

This is an **interactive media kit**. Navigate between pages from the contents page or with the arrows    at the bottom of each page.

Explore scientific and technological themes of the Webb mission through the series of infographics. **Roll over** the graphic elements to discover **hyperlinks** to more information on related webpages.

**Click on the symbol**  to directly access the infographic download page. Links to recommended images, videos and animations are provided towards the end of this media kit.

An internet connection is required to access the external webpages.



# CONTENTS



Mission milestones



Webb in a nutshell



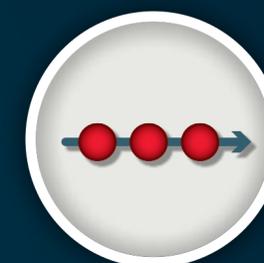
Science



Webb and Ariane 5



Launch timeline



Journey timeline



Unfolding sequence



Hubble and Webb



Instruments



What is spectroscopy?



Why infrared?



Ariane 5



Europe's Spaceport



European partners



Spokespeople



Multimedia



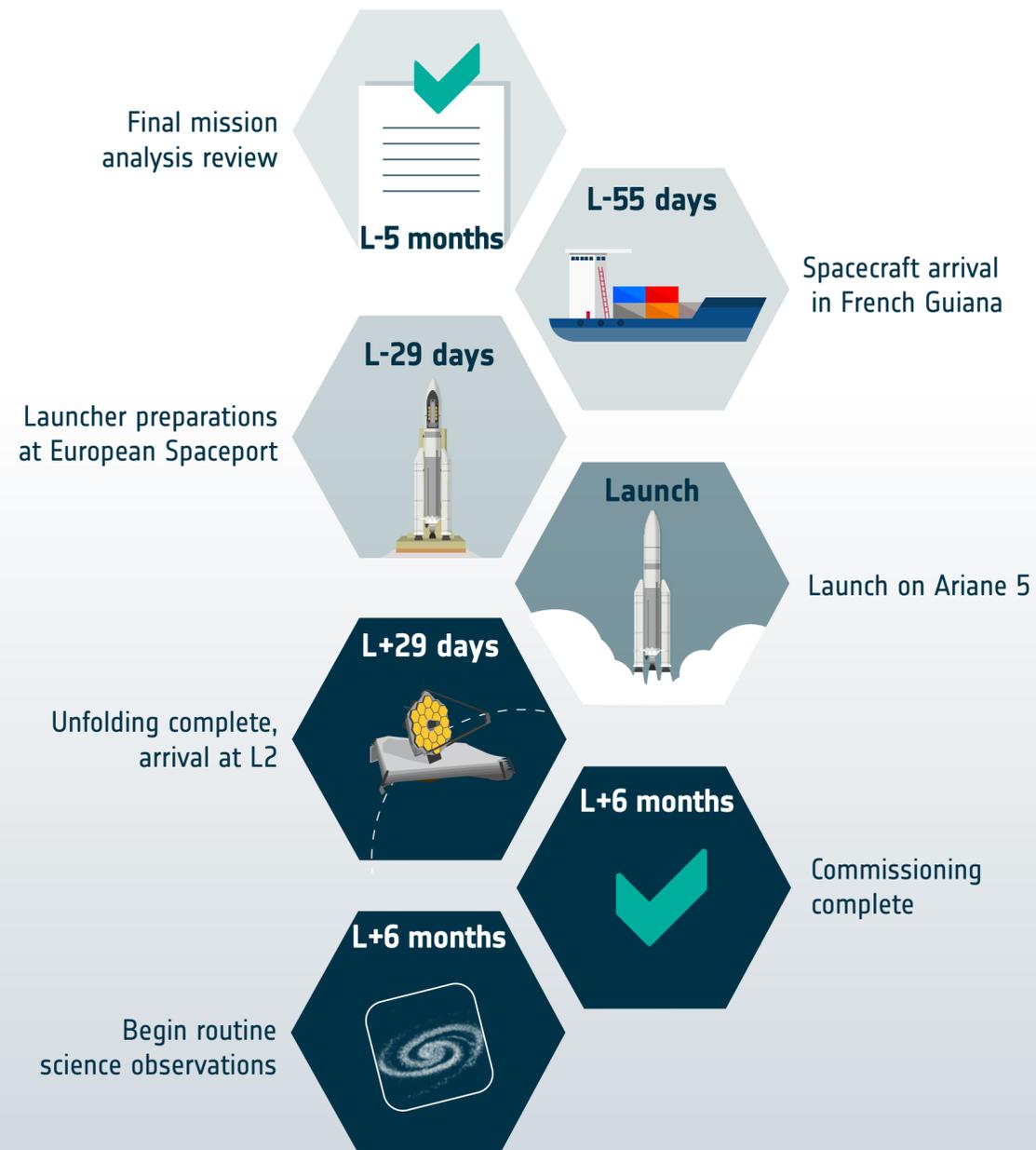
FAQ



Media services and live updates

# WEBB MISSION MILESTONES

The following list gives the main Webb mission milestones anticipated in the coming year. Dates are approximate and more information will be provided via ESA's website (esa.int) and social media channels (@ESA\_Webb) once details are confirmed.



# HOW TO FOLLOW

- ESA Web TV: [esawebtv.esa.int](http://esawebtv.esa.int)
- Information for general public:** [esa.int/webb](http://esa.int/webb)  
**In-depth information:** [sci.esa.int/jwst](http://sci.esa.int/jwst)
- EuropeanSpaceAgency
- @europeanspaceagency
- esa
- @esa  
@ESA\_Webb  
@esascience  
@ariane5

Hashtags: **#Webb** **#UnfoldTheUniverse**  
**#WebbSeesFarther** **#WebbFliesAriane**  
**#WorldWideWebb** **#WebbAtHome**



# WEBB IN A NUTSHELL

Overview of Webb and ESA's contributions to the mission.

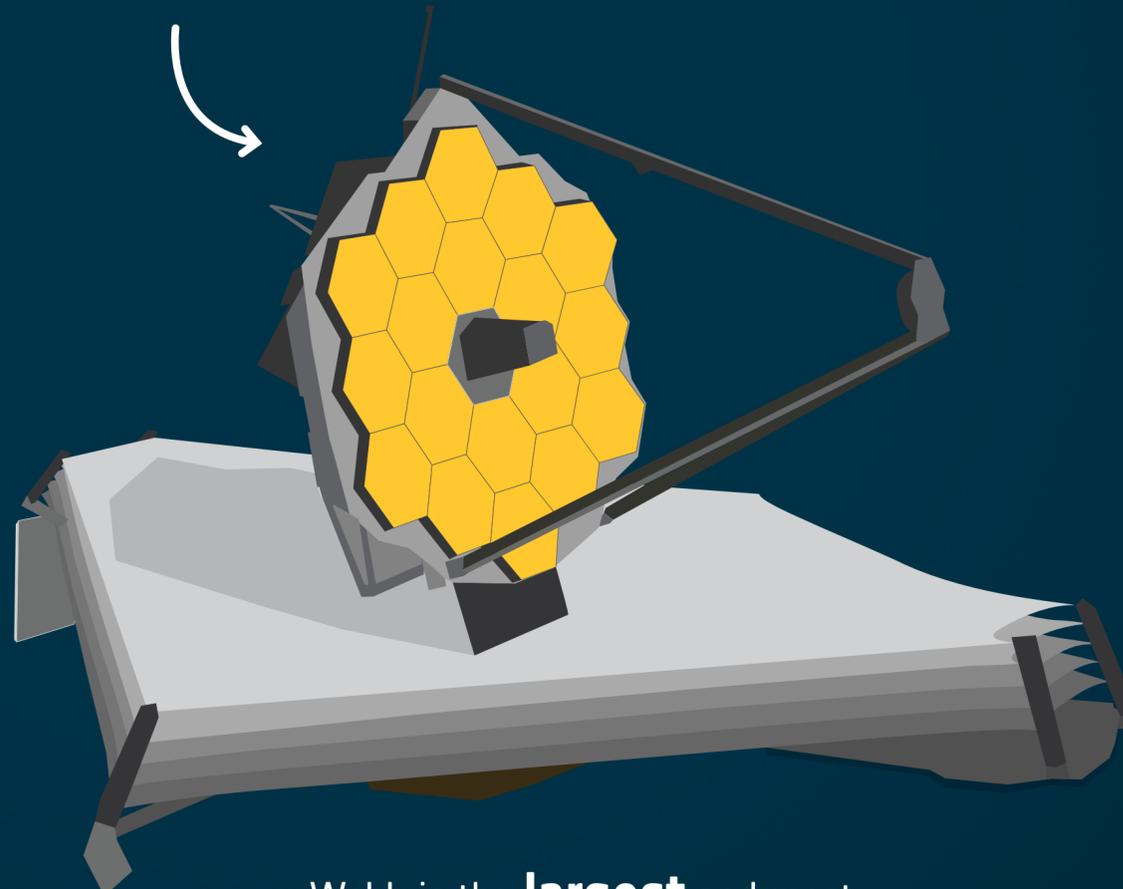
ESA contributed **two** of Webb's four **science instruments**: **NIRSpec** and 50% of **MIRI**



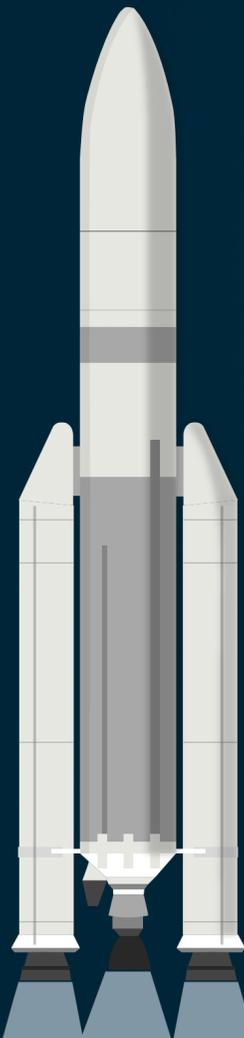
Webb's partners



ESA provides a team of **astronomers** and **engineers** to support **science operations**



Webb is the **largest** and most **powerful** space telescope ever launched



Webb will reach space on an **Ariane 5** from **Europe's Spaceport** in French Guiana, a launch contributed by ESA

Webb observes **near-infrared** to **mid-infrared** light

Webb studies our own **Solar System** and **exoplanets** around other stars

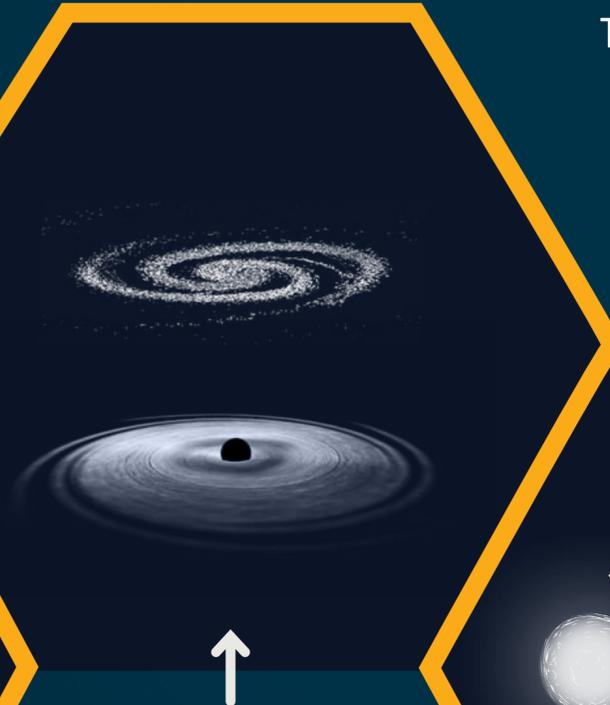
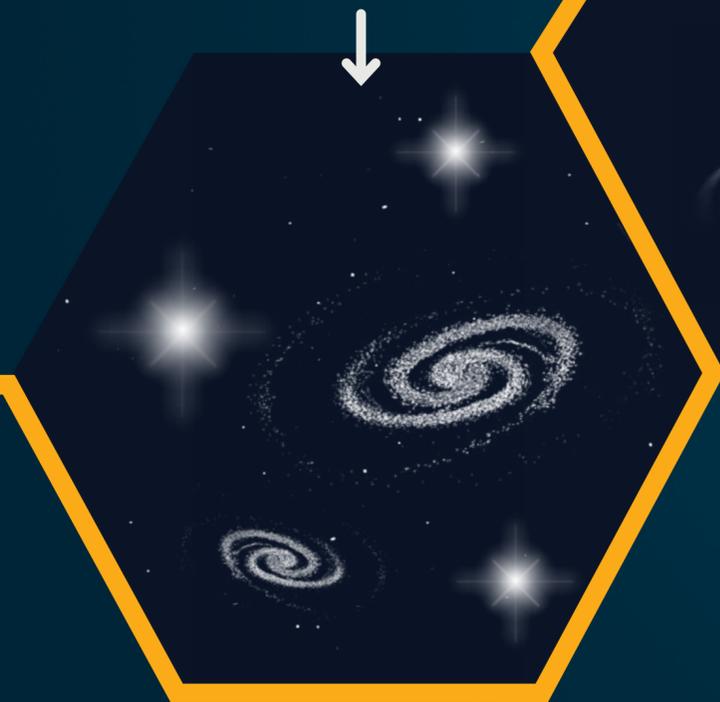
Webb studies the birth of the **first stars** and **galaxies**



# WEBB SCIENCE

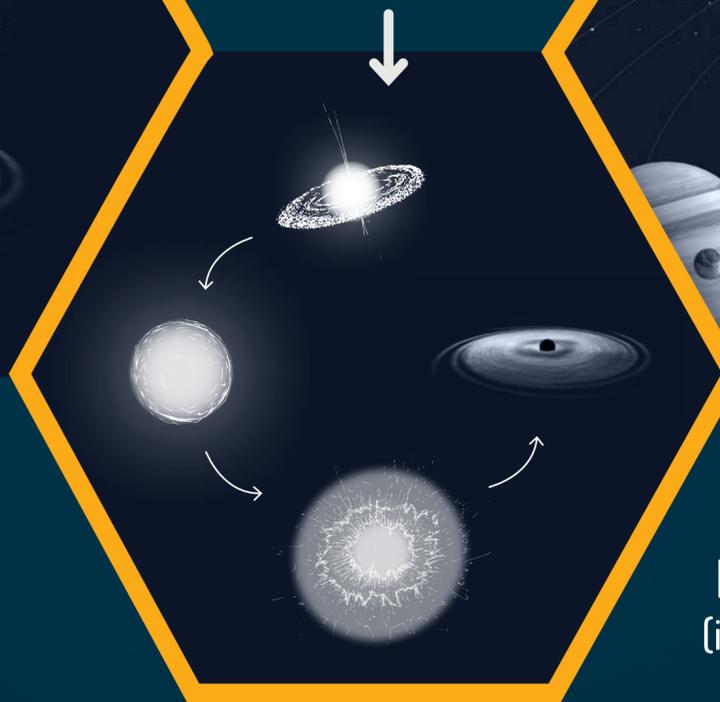
Webb is designed to answer outstanding questions about the Universe and to make breakthrough discoveries in all fields of astronomy.

What did the **early Universe** look like and when did the first stars and galaxies form?



Understanding how **galaxies and black holes** form and evolve

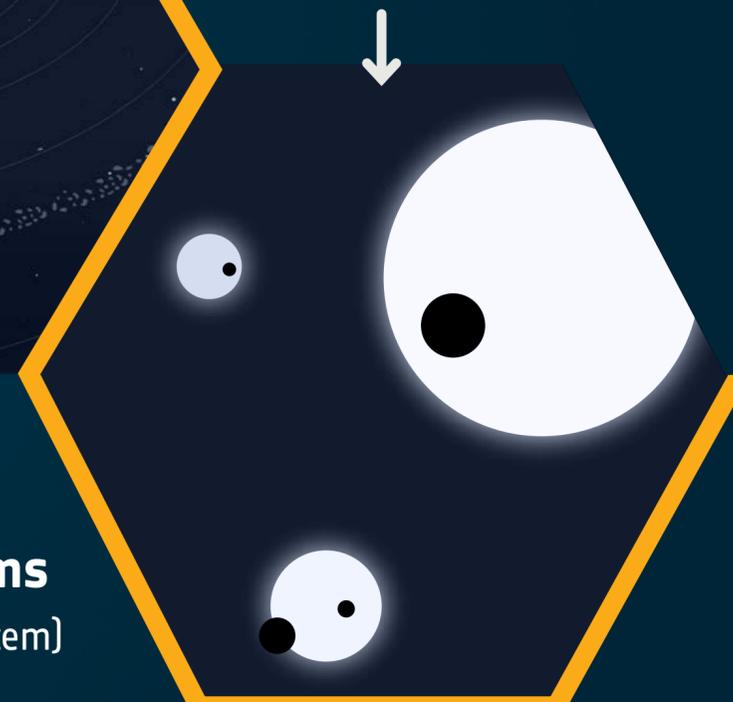
The lifecycle of **stars**: from their birth to their death



Investigating how **planetary systems** (including our Solar System) form and evolve



Studying **exoplanets, their atmospheres,** and the building blocks of life that they might contain



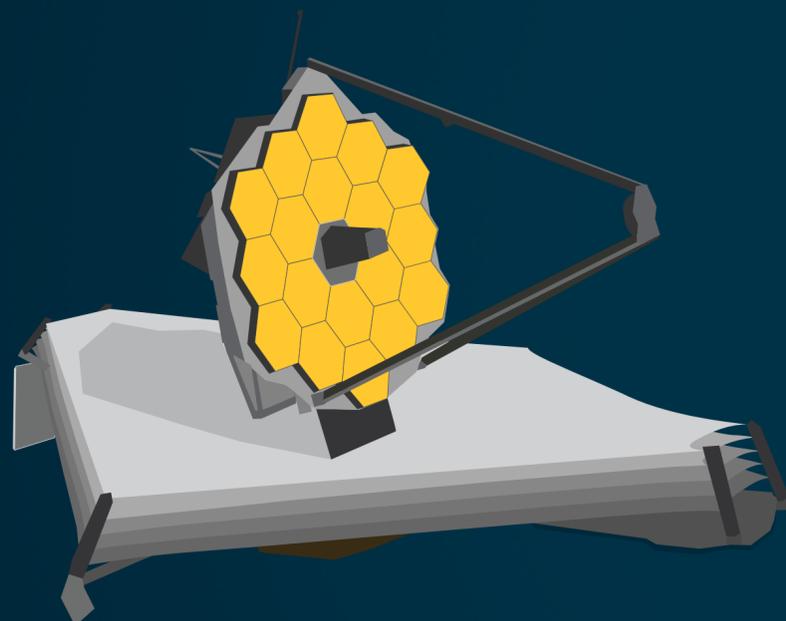
# WEBB AND ARIANE 5: A FIT MADE PERFECT

ESA is flying Webb on an Ariane 5 rocket, which has been customised for this extraordinary telescope.

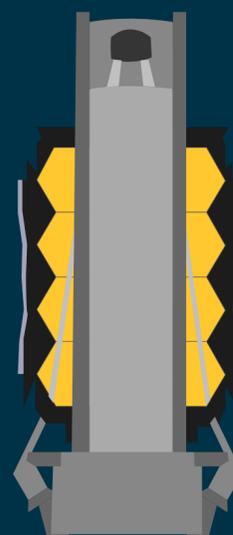
## Webb

Height  
8 m

5-layered  
sunshield  
21.2 x 14.2 m



size of a  
tennis court



## Folded Webb

Height  
10.66 m

Width  
4.5 m



## ← Fairing

Height  
17 m

Diameter  
5.4 m

**28 venting ports**  
allow depressurisation  
during launch sequence

**Oscillating**  
rolling manoeuvre to protect  
Webb from solar radiation  
after fairing separation

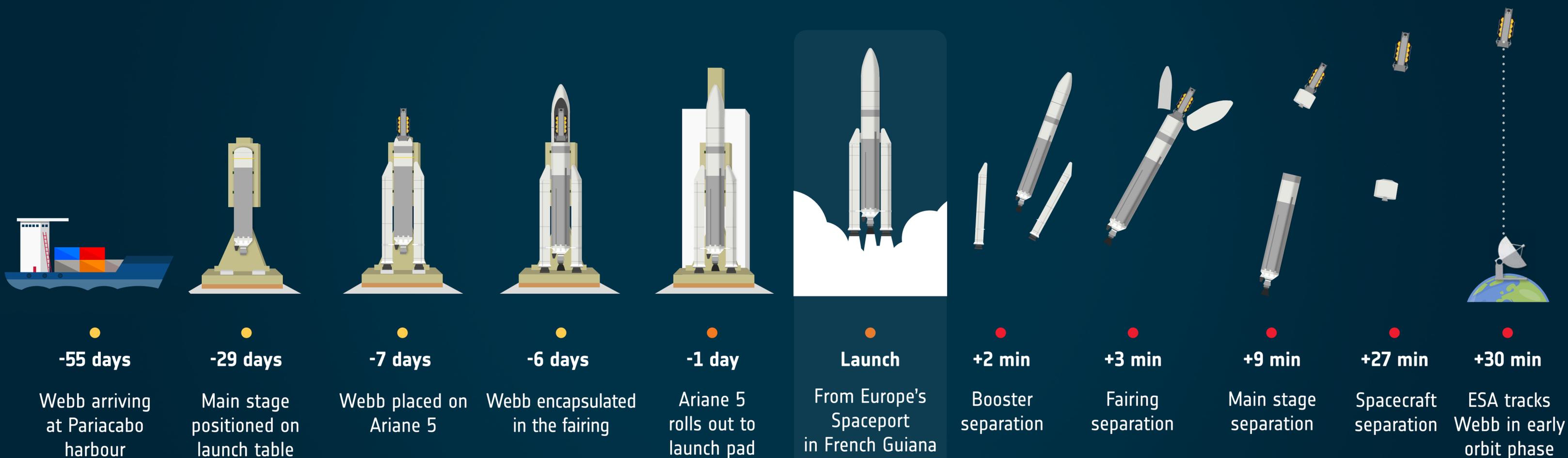


# LAUNCH TIMELINE AT EUROPE'S SPACEPORT

## ASSEMBLY AND INTEGRATION

## LAUNCH

## EN ROUTE TO L2

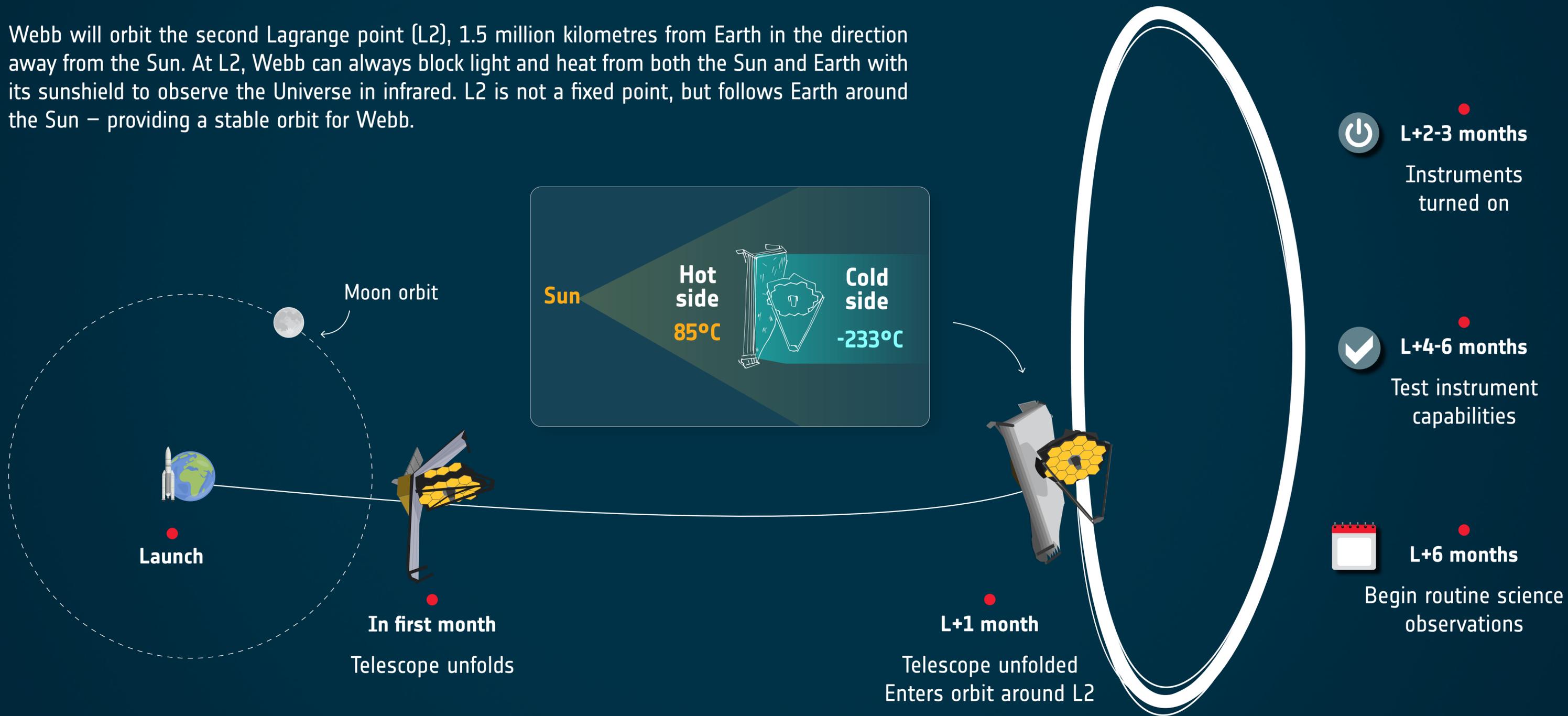


Europe's Spaceport in French Guiana



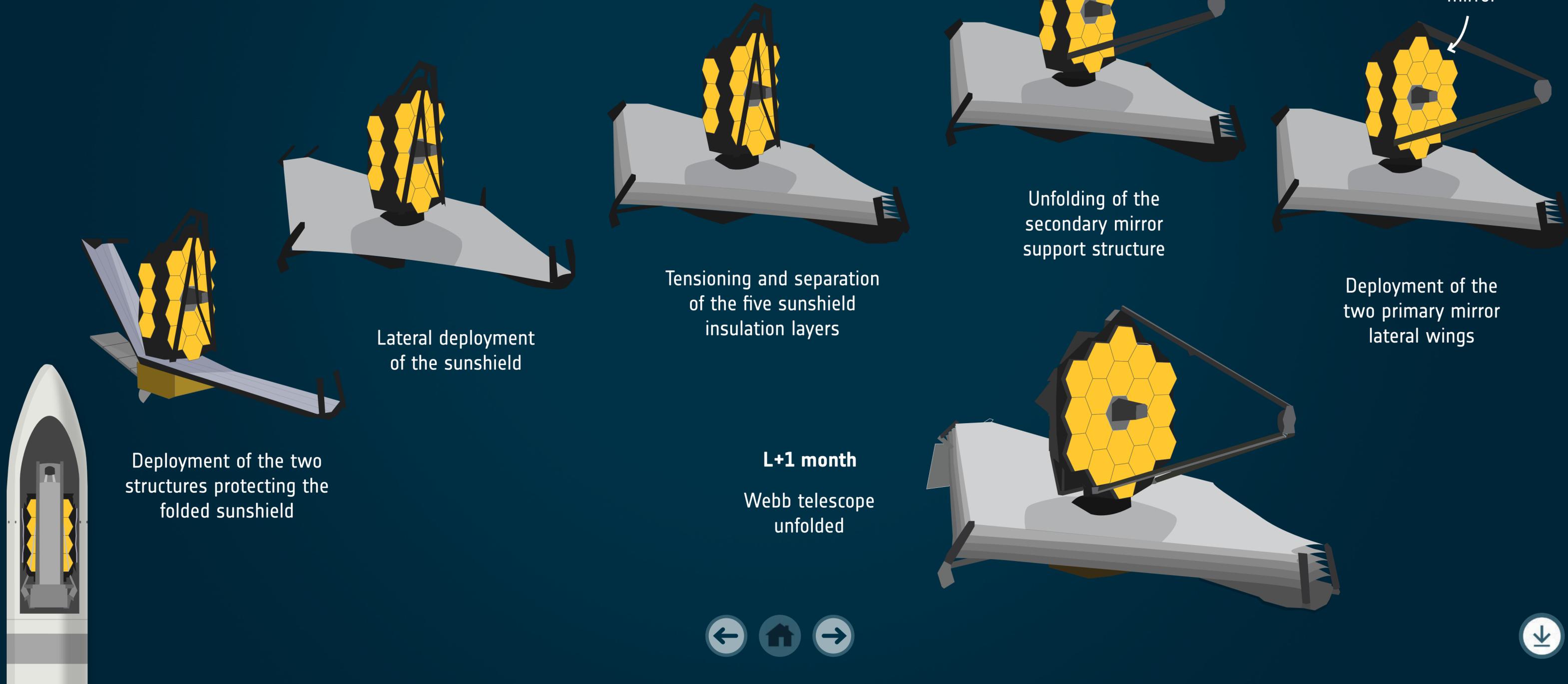
# WEBB'S JOURNEY TO L2

Webb will orbit the second Lagrange point (L2), 1.5 million kilometres from Earth in the direction away from the Sun. At L2, Webb can always block light and heat from both the Sun and Earth with its sunshield to observe the Universe in infrared. L2 is not a fixed point, but follows Earth around the Sun – providing a stable orbit for Webb.



# WEBB UNFOLDING SEQUENCE

Webb is so big that it has to fold origami-style to fit in the Ariane 5 rocket and it will unfold like a 'transformer' in space. This graphic shows a few key steps of the unfolding sequence, which is a complex process that Webb will go through in its month-long journey to L2.



# COMPARING WEBB AND HUBBLE

Webb follows the NASA/ESA Hubble Space Telescope in the line of great space observatories. Both space observatories have different capabilities and will operate in parallel, complementing each other.

### HUBBLE

570 km

Primary mirror  
**2.4 m**

12.5 billion years ago

Young galaxies

### WEBB

1.5 million km

Second Sun-Earth Lagrange point

Primary mirror  
**6.5 m**

**18** mirror segments

13.5 billion years ago

Newborn galaxies

wavelengths

ultraviolet   visible   parts of near-infrared



Serviceable

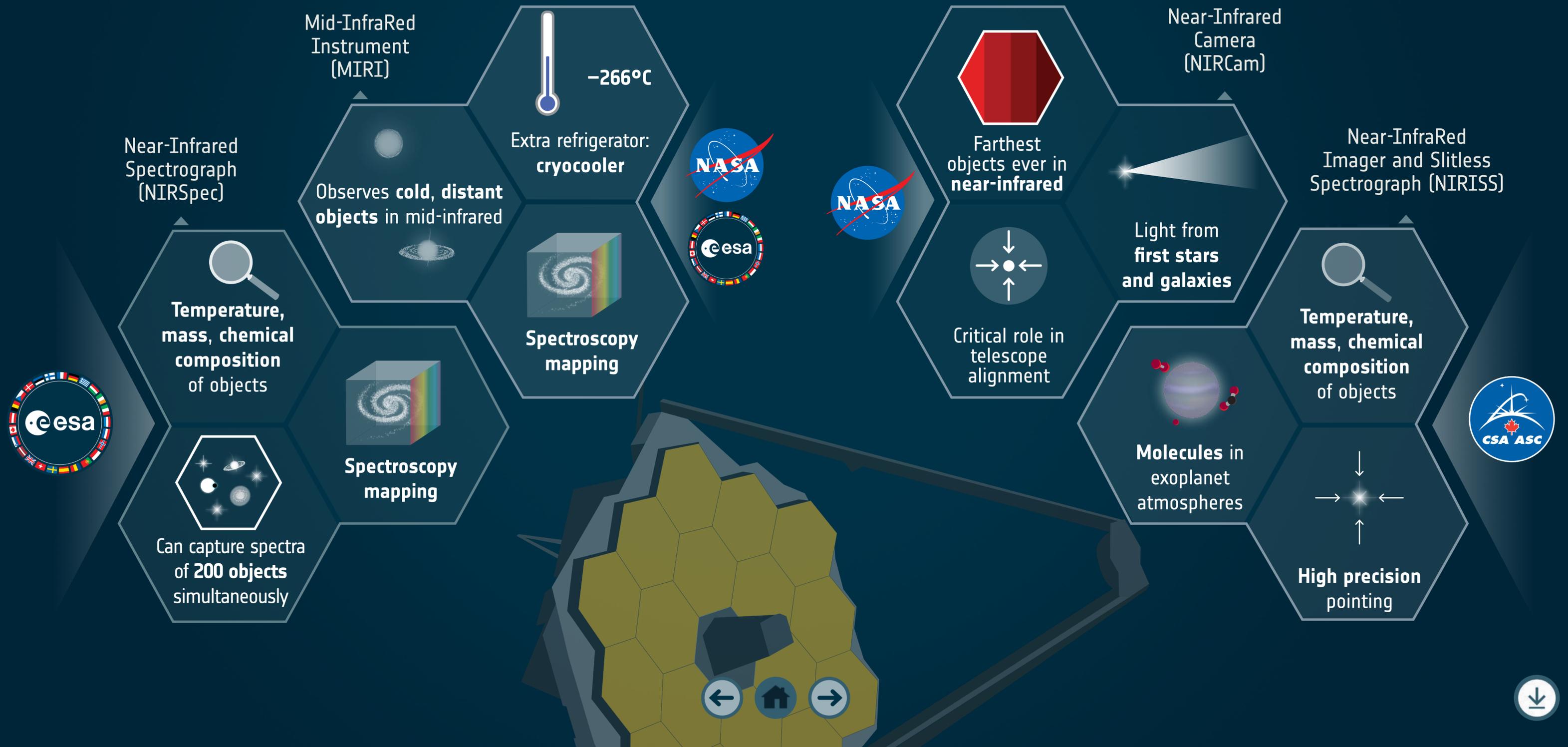


Not serviceable

wavelengths

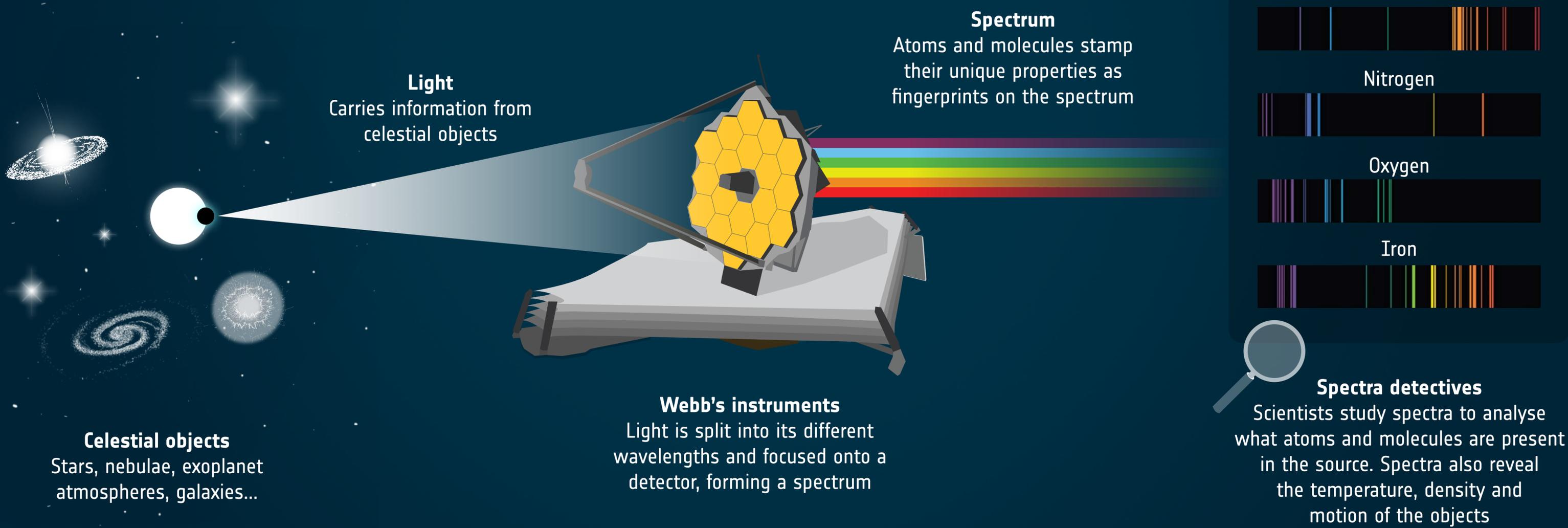
near-infrared   mid-infrared

# WEBB'S SCIENCE INSTRUMENTS



# SPECTROSCOPY WITH WEBB

Spectroscopy is a tool that astronomers use to better understand the physics of objects in space. Like a prism splits white light from the Sun into its colour components (like a rainbow), Webb's spectrographs will dissect infrared light into its many wavelengths. This will provide detailed information about an object, such as how a galaxy moves or what molecules are present in an exoplanet's atmosphere.



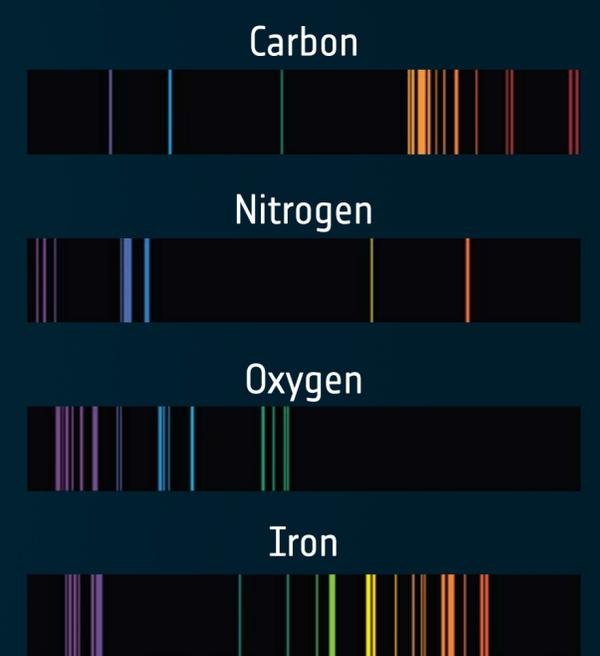
**Celestial objects**  
Stars, nebulae, exoplanet atmospheres, galaxies...

**Light**  
Carries information from celestial objects

**Webb's instruments**  
Light is split into its different wavelengths and focused onto a detector, forming a spectrum

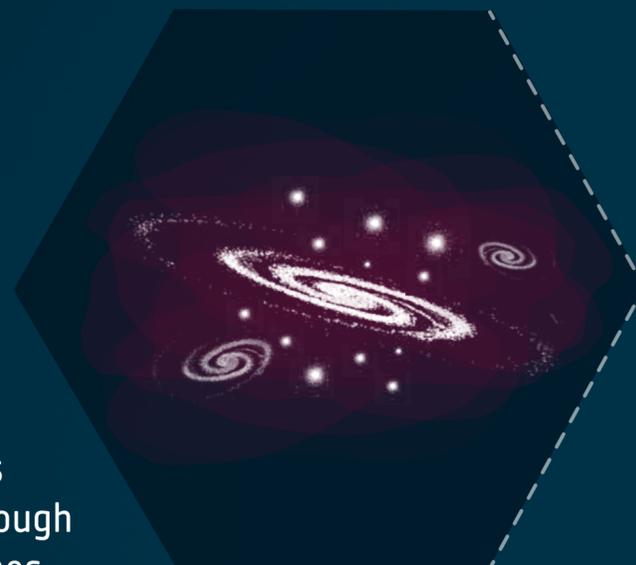
**Spectrum**  
Atoms and molecules stamp their unique properties as fingerprints on the spectrum

**Spectra detectives**  
Scientists study spectra to analyse what atoms and molecules are present in the source. Spectra also reveal the temperature, density and motion of the objects

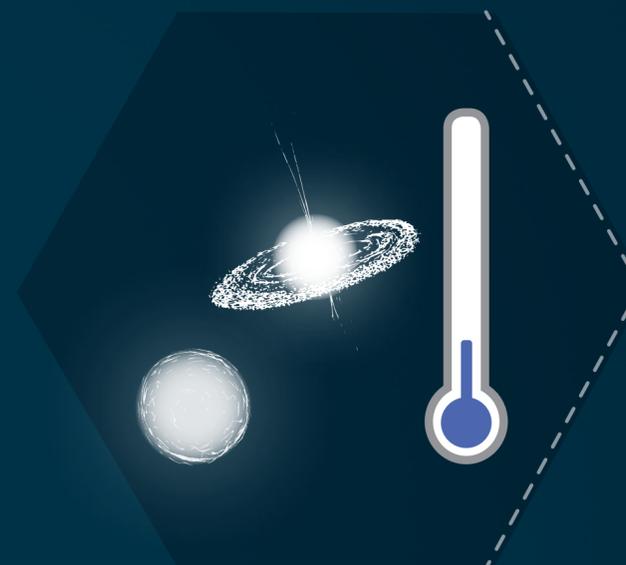


# WHY STUDY THE UNIVERSE IN INFRARED?

The light of galaxies that are billions of light-years away travels to us through space that is expanding. This stretches the light's wavelength into the infrared allowing Webb to see far back in time



Near-infrared light reveals the formation of galaxies, and peers through the dust layers that enshroud new born stars

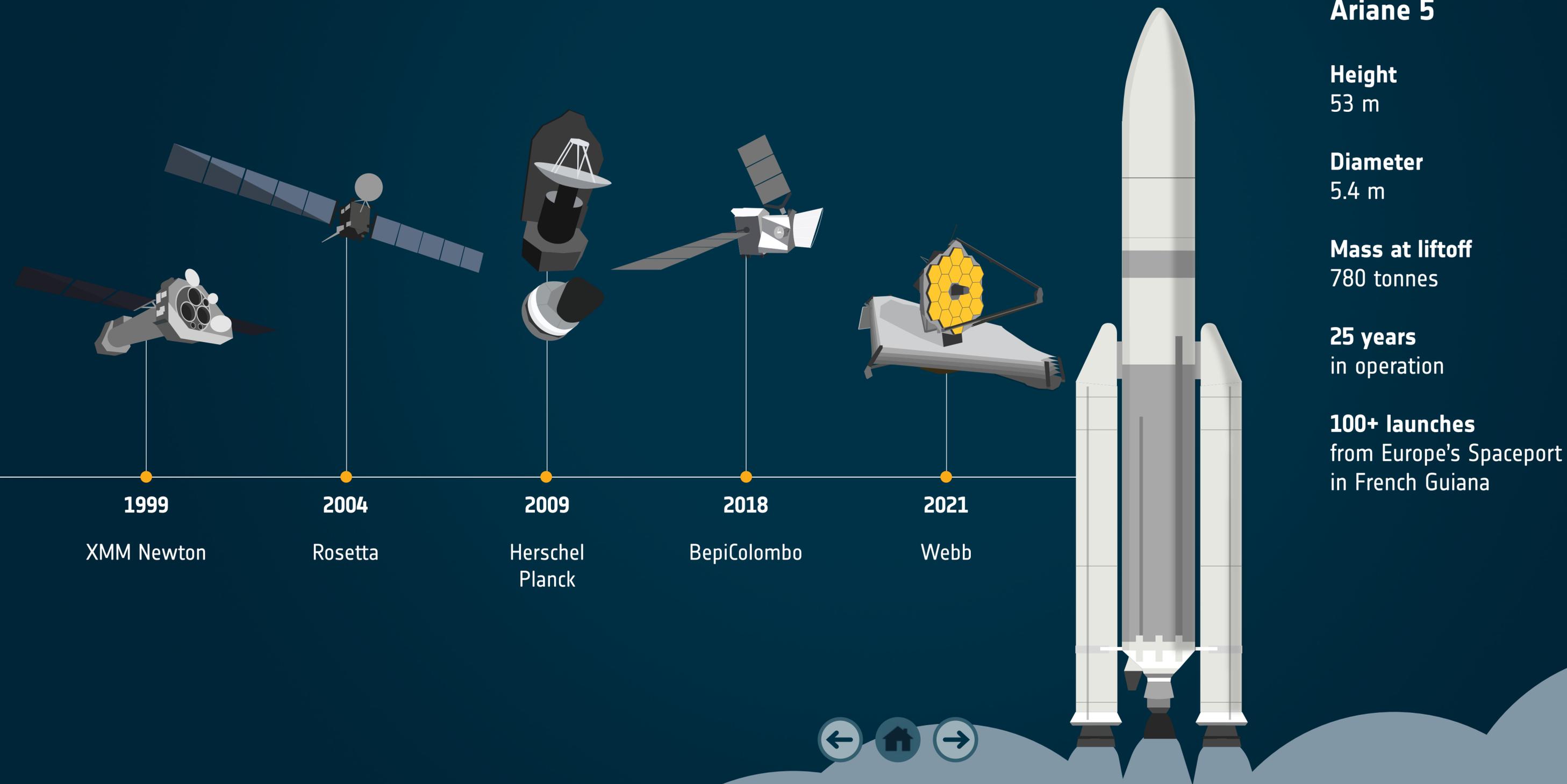


Mid-infrared light peers through the cold dusty regions where stars form, and reveals how massive stars and black holes shape their surroundings



# ARIANE 5'S LEGACY OF LAUNCHING SCIENCE MISSIONS

In operation since 1996, Ariane 5 has launched many ESA space science missions.



# EUROPE'S SPACEPORT: AN IDEAL LAUNCH SITE

250+ Ariane launches  
from French Guiana



High efficiency,  
safety and reliability  
through European teamwork



Customers from  
all over the world

Operational since 1968  
with several launch complexes



Speed of Earth's rotation near  
the equator gives Ariane 5 an extra  
boost during launch



No risk of cyclones  
or earthquakes



Working towards  
**90% renewable energy sources**  
by the end of 2025

With **690 km<sup>2</sup>** jungle, the Spaceport is  
a large protected natural area hosting  
an abundance of wildlife and plants

# EUROPEAN PARTNERS

This map highlights the main contributions of ESA and its European partners to the development of NIRSpec, MIRI and Ariane 5. All ESA Member States contribute through the mandatory Science Programme.

## Austria

RUAG

## Belgium

Centre Spatial de Liège  
KU Leuven

## Denmark

DTU Space  
TERMA

## France (incl. French Guiana)

Arianespace  
ArianeGroup  
CNES  
Airbus Defence and Space  
Safran Reosc  
CRAL  
Mersen Boostec  
CEA  
LESIA/LAM  
IAS

## Germany

Airbus Defence and Space  
Hensoldt Optronics  
IABG  
Max Planck Institute for Astronomy  
University of Cologne  
ArianeGroup

## Italy

Leonardo  
Avio

## Ireland

Dublin Institute for  
Advanced Studies  
Réaltra Space Systems Engineering

## The Netherlands

NOVA-OIR Group  
Leiden University  
TNO

## Spain

Airbus Defence and Space  
Crisa  
IberEspacio  
INTA  
CSIC

## Sweden

RUAG  
Stockholm University

## Switzerland

RUAG  
ETH Zurich  
APCO

## United Kingdom

UK Astronomy Technology Centre  
RAL Space  
Airbus Defence and Space  
University of Leicester  
Cardiff University  
Mullard Space Science Laboratory  
Surrey Satellite Technology Ltd



# SPOKESPEOPLE

All spokespeople can be reached via ESA Media Relations: [media@esa.int](mailto:media@esa.int).

*Flags represent spoken languages.*

## Peter Rumler

ESA Webb Project Manager  
ESTEC, Netherlands



## Mark McCaughrean

ESA Webb Interdisciplinary Scientist  
ESTEC, Netherlands



## Torsten Boeker

ESA NIRSpec Scientist  
STScI, Baltimore, USA



## Timothy Rawle

ESA NIRSpec Scientist  
STScI, Baltimore, USA



## Daniel de Chambure

ESA Ariane 5 Project Manager  
ESA HQ, Paris, France



## Pierre Ferruit

ESA Webb Project Scientist  
ESTEC, Netherlands



## Macarena Garcia Marin

ESA MIRI Scientist  
STScI, Baltimore, USA



## Catarina Alves de Oliveira

ESA NIRSpec Scientist  
ESAC, Spain



## Nora Luetzgendorf

ESA NIRSpec Scientist  
STScI, Baltimore, USA



## Ruedeger Albat

ESA Head of Ariane 5  
ESA HQ, Paris, France



## Antonella Nota

ESA Webb Project Scientist  
STScI, Baltimore, USA



## Sarah Kendrew

ESA MIRI Scientist  
STScI, Baltimore, USA



## Giovanna Giardino

ESA NIRSpec Scientist  
ESTEC, Netherlands



## Stephan Birkmann

ESA NIRSpec Scientist  
STScI, Baltimore, USA



## Kate Underhill

ESA Propulsion Engineer  
ESA HQ, Paris, France



## Marco Sirianni

ESA Webb Development Manager  
STScI, Baltimore, USA



## Brian O'Sullivan

ESA MIRI System Engineer  
STScI, Baltimore, USA



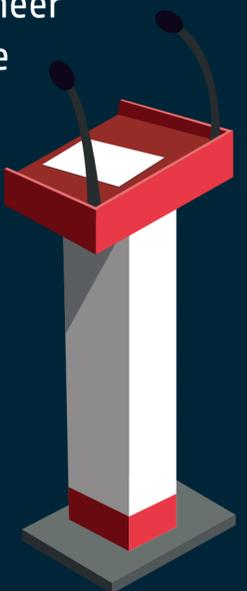
## Maurice te Plate

ESA NIRSpec System Engineer  
NASA GSFC, USA



## Anthony Marston

ESA Webb Archive Scientist  
ESAC, Spain



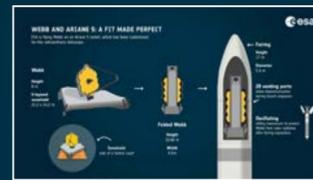
# GRAPHICS



Webb in a nutshell



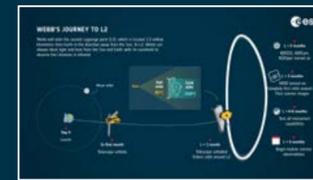
Webb science



Webb and Ariane 5



Launch timeline



Journey to L2



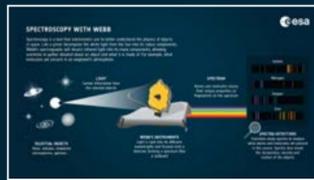
Unfolding sequence



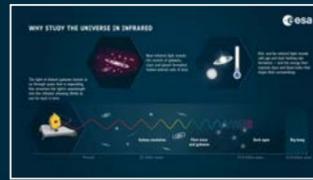
Webb and Hubble



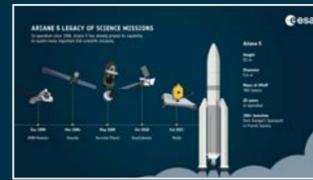
Science instruments



Spectroscopy



Infrared



Ariane 5 legacy



Europe's spaceport



European partners



Exoplanet missions



Webb Poster



Webb logo



Webb artist impression



Launch artist impression



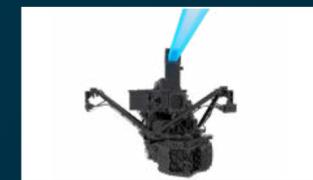
Webb spacecraft



Webb spacecraft



Webb NIRSpec



Webb MIRI



ESA Member States



Establishments and facilities

# IMAGES AND VIDEOS

ESA videos: [www.esa.int/ESA\\_Multimedia/Videos](http://www.esa.int/ESA_Multimedia/Videos)

ESA images: [www.esa.int/ESA\\_Multimedia/Images](http://www.esa.int/ESA_Multimedia/Images)



Connecting the Webb



Webb primary mirror unfolded



Webb primary mirror



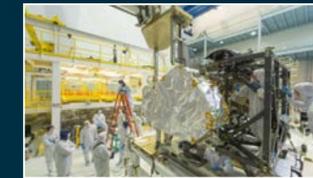
Webb mirror segments



Webb sunshield



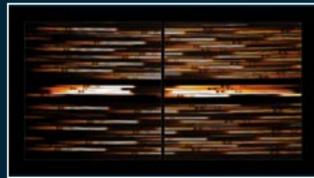
Webb packing



Webb NIRSpec



Webb NIRSpec



Testing NIRSpec



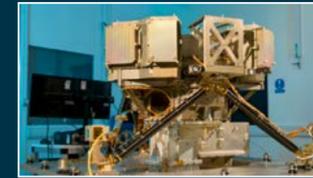
Webb NIRSpec



Integrated Science Instrument Module



Webb MIRI



Webb MIRI



Ariane 5 to launch pad



Technical Centre at Spaceport



Ariane 5 with science missions



Ariane 5 liftoff



Ariane 5 launch



A beacon for science



Europe's spaceport



Webb introduction



Webb launch and deployment



Deployment in detail



Primary mirror assembly

## FREQUENTLY ASKED QUESTIONS 1/2



### What's new about Webb?

Webb will be the largest telescope ever placed in space. It will observe infrared light from space with unprecedented sensitivity, which will allow it to peer back in time over 13.5 billion years to see the first galaxies after the Big Bang.



### What can Webb do, that Hubble can't?

Webb will cover longer wavelengths of light than Hubble and has a 100 times improved sensitivity, which opens up a new window to the Universe. The longer wavelengths enable Webb to uncover hidden parts of our Solar System, peer inside dust clouds where stars and planetary systems are forming, reveal the composition of exoplanets' atmospheres in more detail, and look farther back in time to see the first galaxies that formed in the early Universe.



### Why does Webb observe in infrared?

By observing in infrared, Webb will reveal the hidden Universe to our eyes: stars and planetary systems forming in clouds of dust, and the first light from the earliest stars and galaxies ever formed.



### Who are Webb's partners?

NASA, European Space Agency (ESA) and Canadian Space Agency (CSA)



### What is ESA's contribution to Webb?

Europe plays a crucial role in Webb's science payload, contributing the NIRSpec instrument and a 50% share of the MIRI instrument, and by procuring the launch of the telescope on an Ariane 5 rocket from Europe's Spaceport in French Guiana. ESA scientists are also supporting Webb mission operations at the Space Telescope Science Institute (STScI) in Baltimore, USA. In return for the European contributions, ESA secures access for astronomers from ESA Member States with a minimum share of 15% of Webb observing time. European scientists are represented on all advisory bodies of the project.

## FREQUENTLY ASKED QUESTIONS 2/2



### How will Webb get to its destination?

Webb is folded origami-style to fit in the fairing of the Ariane 5 rocket that will launch the telescope from Europe's Spaceport in French Guiana. From there it will embark on its month-long journey to its final orbit. In the first three weeks after launch, Webb will unfold its delicate five-layered sunshield and will then deploy its large 6.5-metre primary mirror.



### Why is Webb going to L2?

At the second Lagrange point (L2), 1.5 million kilometres from Earth, the telescope can stay in line with the Earth as it moves around the Sun. This allows the satellite's large sunshield to protect the telescope from the light and heat of the Sun and Earth (and Moon). At L2, Webb can maintain its extremely cold operating temperature, stable pointing and high observing efficiency.



### When will Webb arrive at its destination?

Webb will travel for about a month to reach its orbit at L2.



### How will ESA support the flight of Webb on Ariane 5?

From the moment of liftoff until separation, CNES Launch Range services will track Ariane 5 from ground stations in Kourou, in Ascension Island (South Atlantic), Natal (Brazil), Libreville (Gabon) and Malindi (Kenya).

Immediately after Webb separates from the Ariane 5, ESA's tracking station network, ESTRACK, will follow the Early Orbit Phase operations using its Malindi ground station in collaboration with NASA's station network. ESTRACK is a network of ground stations in seven countries, able to track spacecraft almost anywhere, even those voyaging deep into our Solar System.

# MEDIA SERVICES AND LIVE UPDATES

## Newsroom and Media Relations

<https://www.esa.int/Newsroom>  
[media@esa.int](mailto:media@esa.int)

## Ninja Menning

**Head of Newsroom and Media Relations**  
ESA ESTEC, Netherlands

## Arnaud Marsollier

**Head of Contents Office**  
ESA ESTEC, Netherlands

## Kai Noeske

**Science Communication  
Programme Officer**  
ESA ESTEC, Netherlands

## Ioana Lung

**Space Transportation  
Communications Officer**  
ESA ESRIN, Italy



ESA Web TV: [esawebtv.esa.int](http://esawebtv.esa.int)



**Information for general public:** [esa.int/webb](http://esa.int/webb)  
**In-depth information:** [sci.esa.int/jwst](http://sci.esa.int/jwst)



EuropeanSpaceAgency



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@ESA\_Webb  
@esascience  
@ariane5

Hashtags: [#Webb](#) [#UnfoldTheUniverse](#)  
[#WebbSeesFarther](#) [#WebbFliesAriane](#)  
[#WorldWideWebb](#) [#WebbAtHome](#)





## THE EUROPEAN SPACE AGENCY

Established in 1975, ESA now has 22 Member States and cooperates with many others. These countries are home to more than 500 million European citizens. If you're one of them, then we're working for you.

Our mission is the peaceful exploration and use of space for the benefit of everyone. We watch over Earth, develop and launch inspiring and unique space projects, fly astronauts and push the boundaries of science and technology, seeking answers to the big questions about the Universe.

We are a family of scientists, engineers and business professionals from all over Europe, working together in a diverse and multinational environment.

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