



James Webb Space Telescope

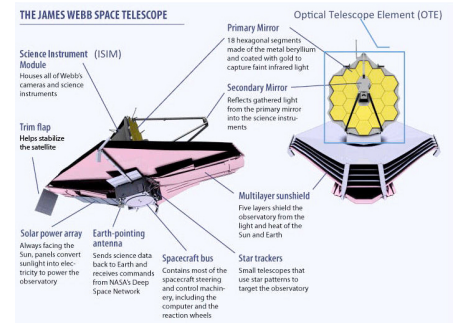
Why in News

The [James Webb Space Telescope \(JWST\)](#) is scheduled to be rocketed into orbit later this year (2021).

Key Points

▪ About:

- It is the **most powerful infrared telescope** of [National Aeronautics and Space Administration \(NASA\)](#).
- It is also considered a successor of the [Hubble Telescope](#) and will extend and complement its discoveries.
 - Launched into [low Earth orbit](#) in **1990**, the Hubble Space Telescope has made more than 1.4 million observations, including tracking interstellar objects, capturing a comet colliding with Jupiter, and discovering moons around Pluto.
 - Hubble has **captured galaxies merging, probed [supermassive black holes](#)** and has helped us understand the history of our universe.
- The telescope is the **result of an international collaboration** between NASA, the European Space Agency (ESA) and the Canadian Space Agency.
- Webb will **reveal new and unexpected discoveries**, and help humanity understand the origins of the universe and our place in it.
- The telescope will study the atmospheres of a **wide diversity of [exoplanets](#)**.
- It will **also search for atmospheres similar to Earth's**, and for the signatures of key substances such as methane, water, oxygen, carbon dioxide, and complex organic molecules, in hopes of finding the building blocks of life. [//](#)



▪ **Launch:**

- It will be launched on an **Ariane 5 ECA rocket** from French Guiana in South America.
- The **Ariane 5** is believed to be **one of the most reliable launch vehicles**.

▪ **Goal:**

- To **search for the first galaxies** that formed after the Big Bang.
- To **determine how galaxies evolved** from their earlier formation until now.
- To **observe the formation of stars** from the first stages to the formation of planetary systems.
- To **measure the physical and chemical properties** of planetary systems and investigate the potential for life in such systems.

▪ **Webb Vs Hubble Telescope:**

◦ **Wavelength:**

- The JWST will **observe primarily in the infrared range** and provide coverage from 0.6 to 28 microns.
- The instruments on **Hubble see mainly in the ultraviolet and visible part of the spectrum**. It could observe only a small range in the infrared from 0.8 to 2.5 microns.
- The **infrared region of the electromagnetic spectrum** covers the wavelength range from approximately 0.7 to a few 100 microns.

◦ **Size:**

- Webb's primary mirror has a **diameter of 6.5 metres while Hubble's mirror was much smaller - 2.4 metres in diameter**.
- So, Webb will have a **larger field of view compared to the camera on Hubble**.
- Webb also **carries a large sun shield**.

◦ **Distance:**

- Webb's near- and mid-infrared instruments will **help study the first formed galaxies, exoplanets and birth of stars**.
- Hubble can see the equivalent of **"toddler galaxies"** while Webb Telescope will be able to see **"baby galaxies"**.

▪ **Other Major Infrared Telescope:**

- **Herschel Space Observatory Telescope:** It is an **infrared telescope**, launched in **2009** by the European Space Agency.
- It also **orbits the Sun similar to how Webb would**. The **primary difference between Webb and Herschel** is the **wavelength** range: Webb goes from 0.6 to 28 microns, while Herschel covers 60 to 500 microns.

- Herschel's mirror is **smaller than Webb's**. It is 3.5 metres in diameter, while Webb's primary mirror has a diameter of 6.5 metres.

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