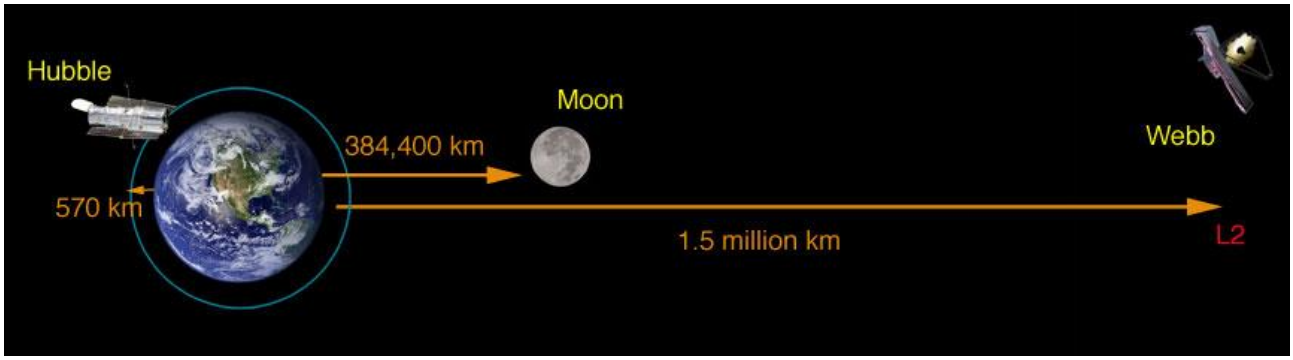
ABOUT WEBB ORBIT

From webb.nasa.gov/content/about/orbit.html

The James Webb Space Telescope will not be in orbit around the Earth, like the Hubble Space Telescope is - it will actually orbit the Sun, 1.5 million kilometers (1 million miles) away from the Earth at what is called the second Lagrange point or L2. What is special about this orbit is that it lets the telescope 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).



Why Does The Direction Of The Earth And Sun Matter?

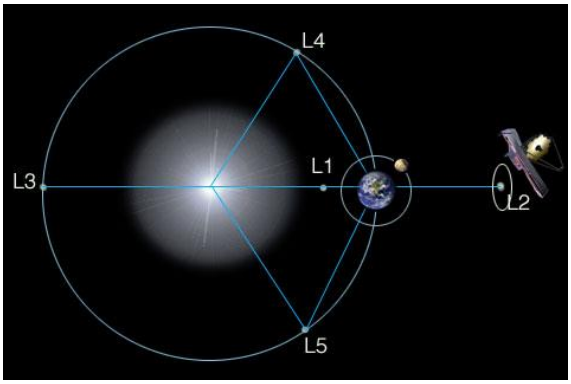
Webb primarily observes infrared light, which can sometimes be felt as heat. Because the telescope will be observing the very faint infrared signals of very distant objects, it needs to be shielded from any bright, hot sources. This also includes the satellite itself! The sunshield serves to separate the sensitive mirrors and instruments from not only the Sun and Earth/Moon, but also the spacecraft bus.

The telescope itself will be operating at about 225 degrees below zero Celsius (minus 370 Fahrenheit). The temperature difference between the hot and cold sides of the telescope is huge - you could almost boil water on the hot side, and freeze nitrogen on the cold side!

To have the sunshield be effective protection against the light and heat of the Sun/Earth/Moon, these bodies all have to be located in the same direction.

This is why the telescope will be out at the second Lagrange point.

What Is L2?



Joseph-Louis Lagrange was an 18th century mathematician who found the solution to what is called the “three-body problem.” That is, is there any stable configuration, in which three bodies could orbit each other, yet stay in the same position relative to each other? As it turns out, there are five solutions to this problem - and they are called the five Lagrange points, after their discoverer. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. The L1, L2, and L3 points are all in line with each other - and L4 and L5 are at the points of equilateral triangles.

DOMANDE

1. Lo schema che raffigura le posizioni di HST e JWST è in scala?
2. Il telescopio Hubble è molto più vicino alla Terra di quanto sarà il James Webb. Quale può essere (secondo te) un vantaggio di questa posizione?
3. Perché il JWST verrà “parcheggiato” nel punto lagrangiano L2?
4. La temperatura del telescopio James Webb è vicina allo zero assoluto?
5. Cosa si intende con “problema dei tre corpi”?

COMPITO

Esplorare il sito webb.nasa.gov. Quali sono i principali obiettivi scientifici del James Webb Space Telescope?