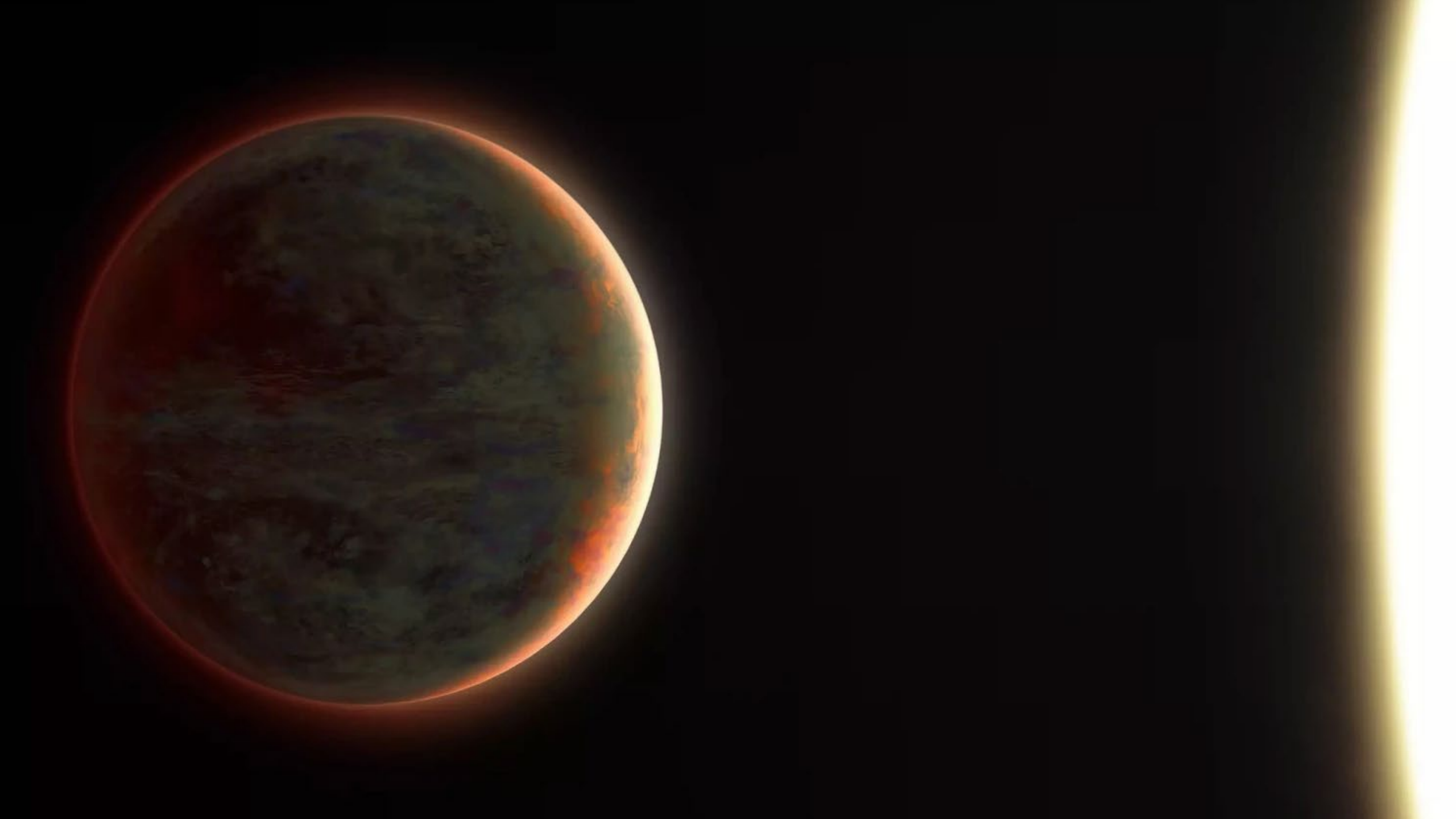


Astronomy News

KW RASC FRIDAY FEBRUARY 25
2022

JIM FAIRLES

Eta Carinae Nebula NGC 3372 Marie Newman



Astronomers scope out planet where it rains jewels and has metal clouds

- ▶ <https://nypost.com/2022/02/23/astronomers-scope-out-planet-where-it-rains-jewels-and-has-metal-clouds/>
- ▶ Scientists have discovered an exoplanet called WASP-121 b where it rains liquified rubies and sapphires.
- ▶ WASP-121 b, as the planet is known, is home to clouds of vaporized metals instead of the fluffy stuff like we have back here on Earth.
- ▶ Clouds on the planet are mainly made up of metals like iron, magnesium, chromium and vanadium.
- ▶ “With impurities of chromium, iron, titanium or vanadium, we know it as ruby or sapphire.”
- ▶ The team used the Hubble Space Telescope to carry out their research on the permanent night side of the planet.
- ▶ But given the sheer distance and extreme temperatures, hope of harvesting the gems is nil.



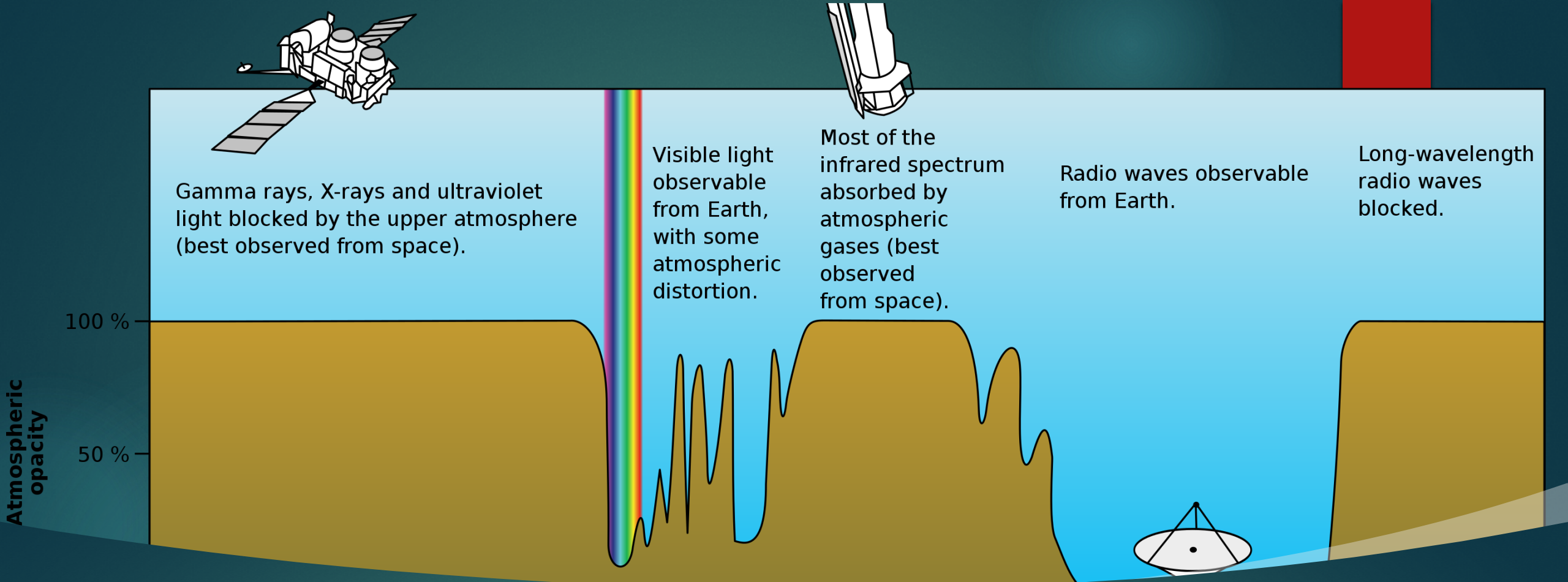
NASA's Roman mission could snap first image of a Jupiter-like world

- ▶ <https://phys.org/news/2022-02-nasa-roman-mission-snap-image.html>
- ▶ NASA's Nancy Grace Roman Space Telescope, now under construction, will test new technologies for space-based planet hunting. The mission aims to photograph worlds and dusty disks around nearby stars with detail up to a thousand times better than possible with other observatories.
- ▶ The Coronagraph Instrument will perform several hundred times better than current instruments, so we will be able to see Jupiter-like planets that are more than 100 million times fainter than their host stars.
- ▶ The Coronagraph Instrument will contain several state-of-the-art components that have never flown aboard a space-based observatory before.
- ▶ Using this technology, Roman will observe planets so faint that special detectors will count individual photons of light as they arrive, seconds or even minutes apart



Dog kennel hit by meteorite sells at auction

- ▶ <https://phys.org/news/2022-02-dog-kennel-meteorite-auction.html>
- ▶ A Christie's auction of rare meteorites Wednesday sold a rock from space that narrowly missed a German Shepherd when it smashed into his kennel in Costa Rica.
- ▶ The buyer paid \$21,420 for the three-by-1.5 inch (eight-by-four centimeter) carbonaceous chondrite stone that landed in the garden of dog Roky's owner's home in Aguas Zarcas in April 2019.
- ▶ The wood and tin doghouse itself, complete with a seven-inch hole marking where the meteorite punctured the roof, sold separately for \$44,100, Christie's said.
- ▶ It was a disappointing auction for Mars, though. The 20-pound (9.1 kg) Martian rock had been priced at between \$500,000 and \$800,000 but failed to find a buyer.



James Webb Update



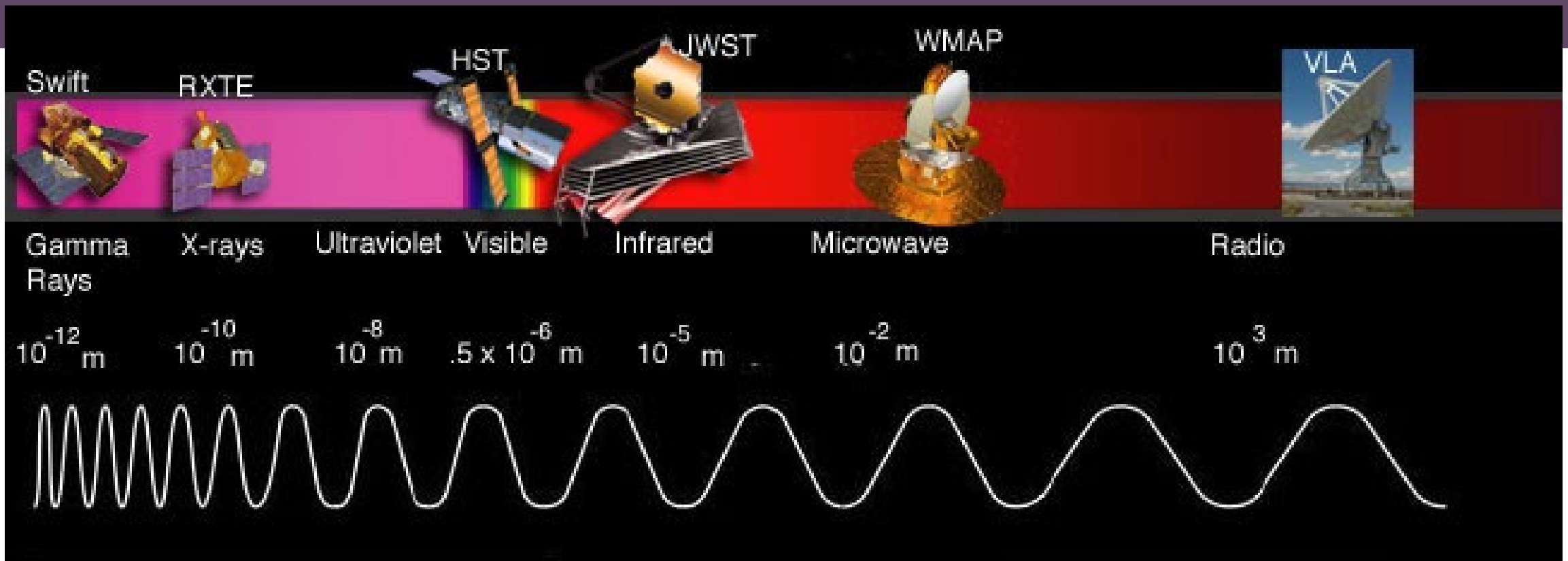
Hubble's visible and infrared views of the Monkey Head Nebula.

Hubble vs James Webb – visible vs Infrared

- ▶ <https://www.jwst.nasa.gov/content/about/comparisonWebbVsHubble.html#:~:text=The%20instruments%20on%20Hubble%20can,from%200.1%20to%200.8%20microns.>
- ▶ Webb often gets called the replacement for Hubble, but we prefer to call it a successor. After all, Webb is the scientific successor to Hubble; its science goals were motivated by results from Hubble. Hubble's science pushed us to look to longer wavelengths to "go beyond" what Hubble has already done. In particular, more distant objects are more highly redshifted, and their light is pushed from the UV and optical into the near-infrared. Thus observations of these distant objects (like the first galaxies formed in the Universe, for example) requires an infrared telescope.

Hubble vs James Webb – visible vs Infrared

- ▶ This is the other reason that Webb is not a replacement for Hubble; its capabilities are not identical. Webb will primarily look at the Universe in the infrared, while Hubble studies it primarily at optical and ultraviolet wavelengths (though it has some infrared capability).
- ▶ Webb also has a much bigger mirror than Hubble. This larger light collecting area means that Webb can peer farther back into time than Hubble is capable of doing. Hubble is in a very close orbit around the earth, while Webb will be 1.5 million kilometers (km) away at the second Lagrange (L2) point.



The instruments on Hubble can observe a small portion of the infrared spectrum from 0.8 to 2.5 microns, but its primary capabilities are in the ultra-violet and visible parts of the spectrum from 0.1 to 0.8 microns.

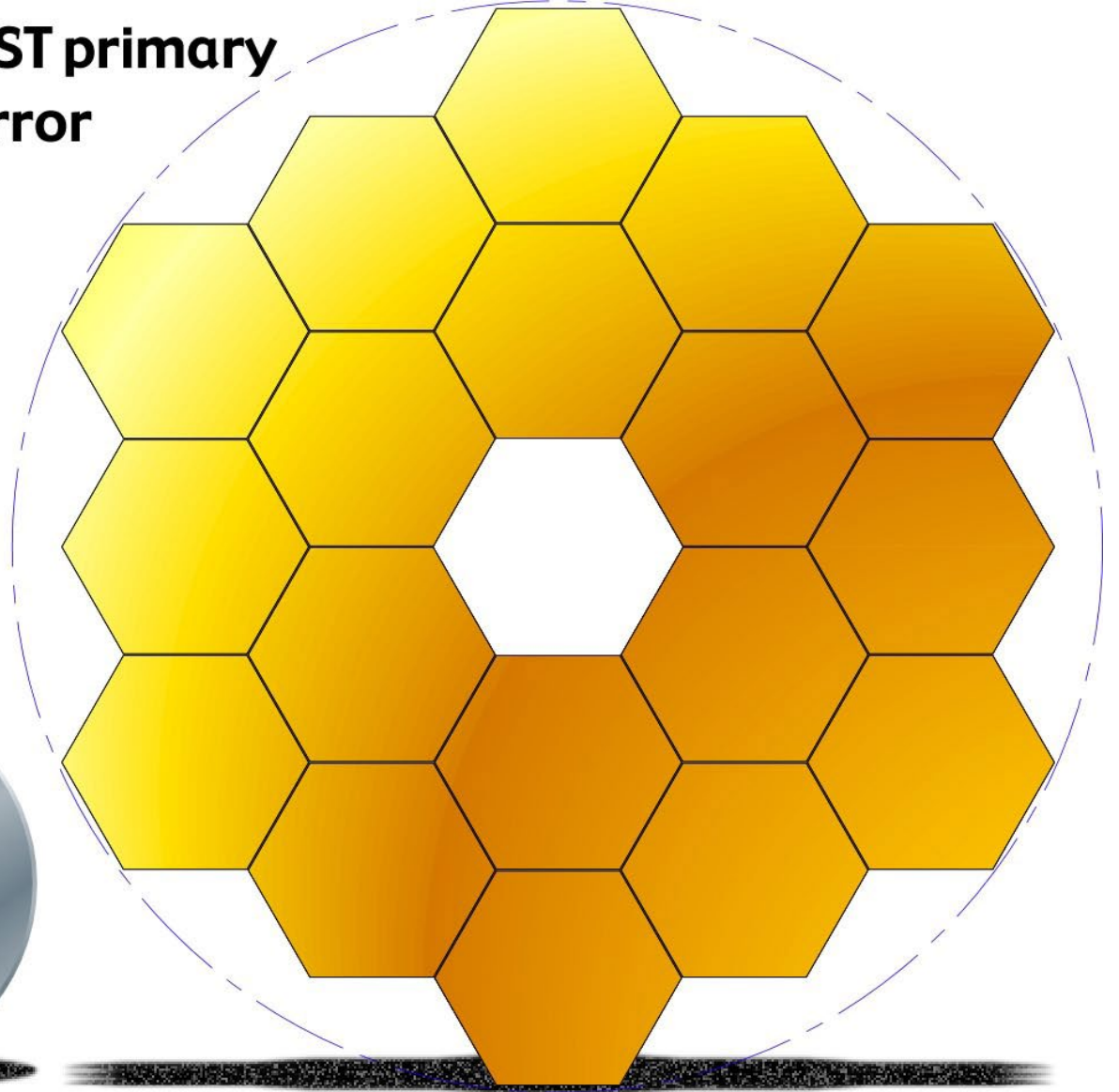
Webb will observe primarily in the infrared and will have four science instruments to capture images and spectra of astronomical objects. These instruments will provide wavelength coverage from 0.6 to 28 micrometers

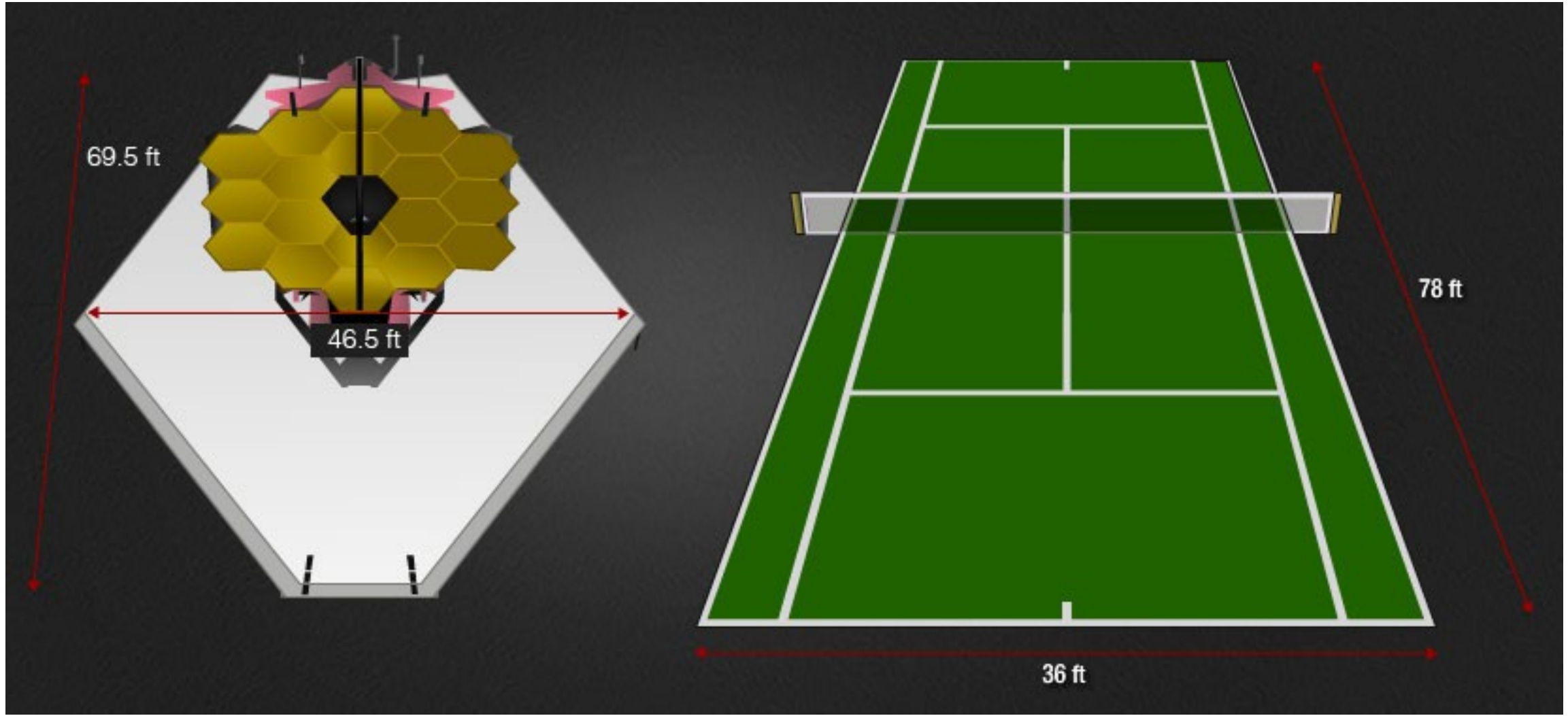
Webb will have an approximately 6.5 meter diameter primary mirror, which would give it a significantly larger collecting area than the mirrors available on the current generation of space telescopes. Hubble's mirror is a much smaller 2.4 meters in diameter and its corresponding collecting area is 4.5 m², giving Webb around 6.25 times (see calculation) more collecting area! Webb will have significantly larger field of view than the NICMOS camera on Hubble (covering more than ~15 times the area) and significantly better spatial resolution than is available with the infrared Spitzer Space Telescope.

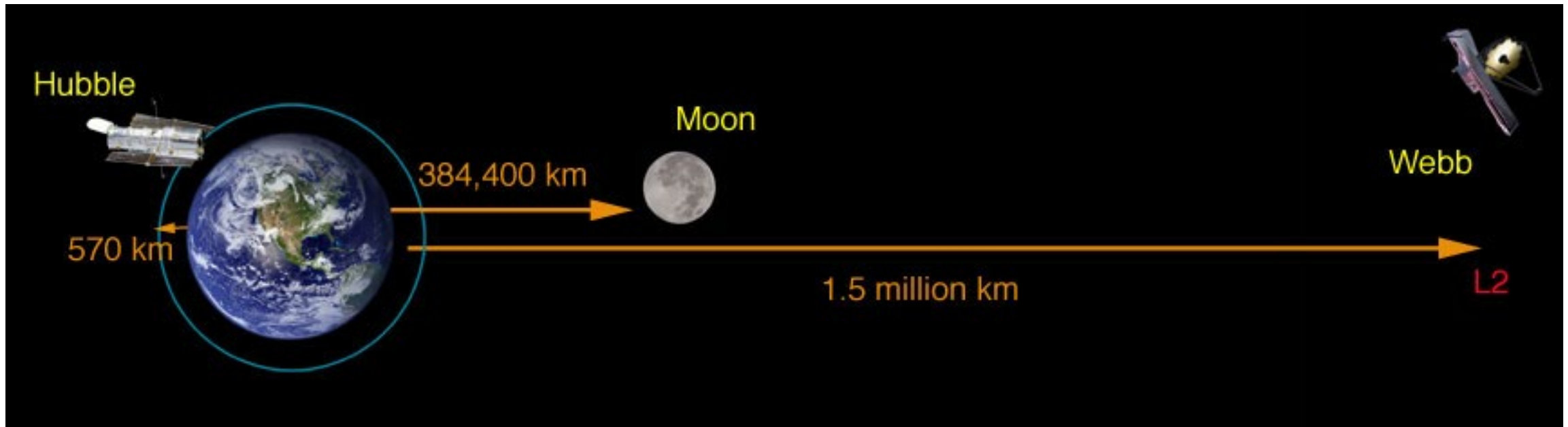
Hubble primary mirror



JWST primary mirror

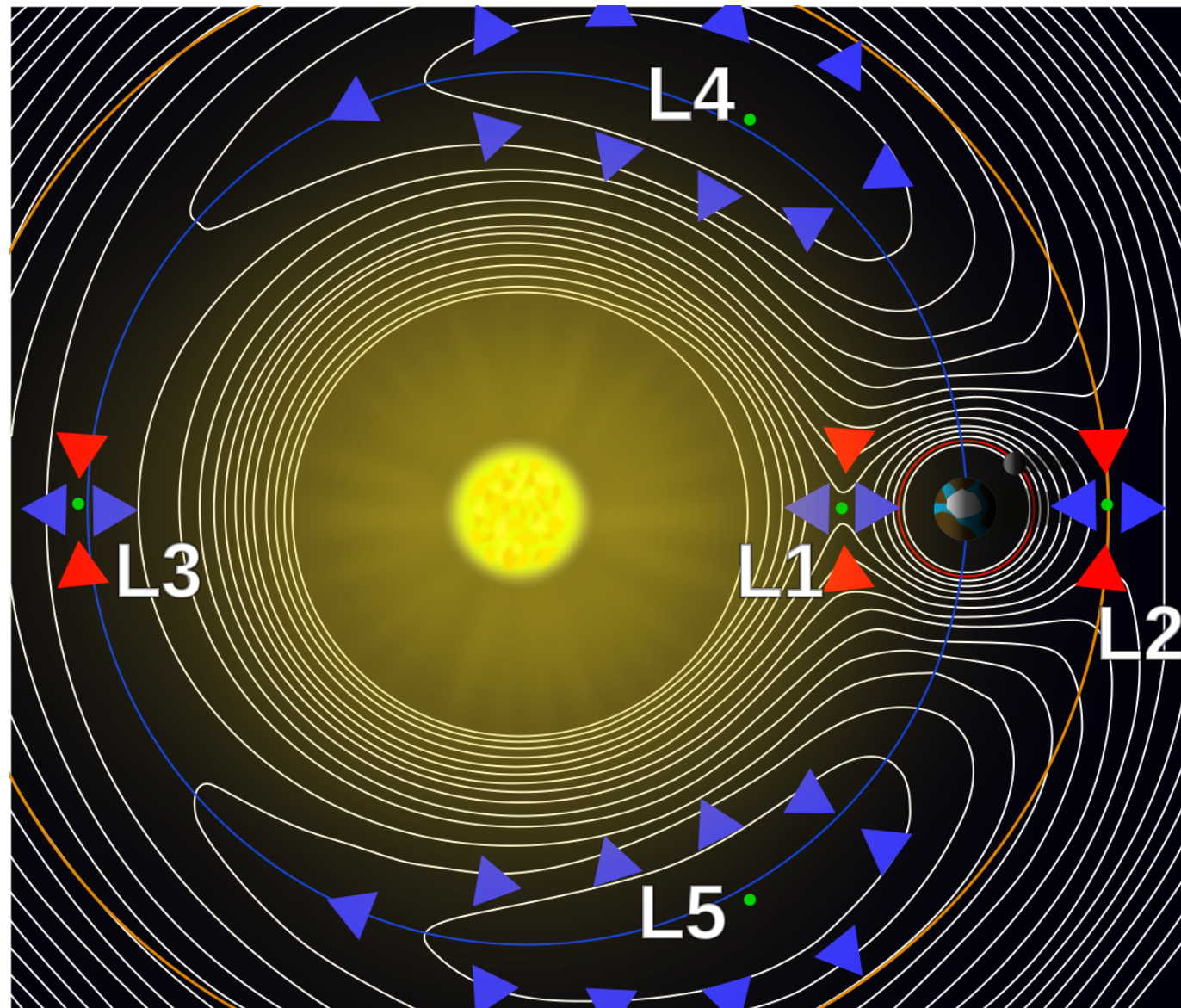




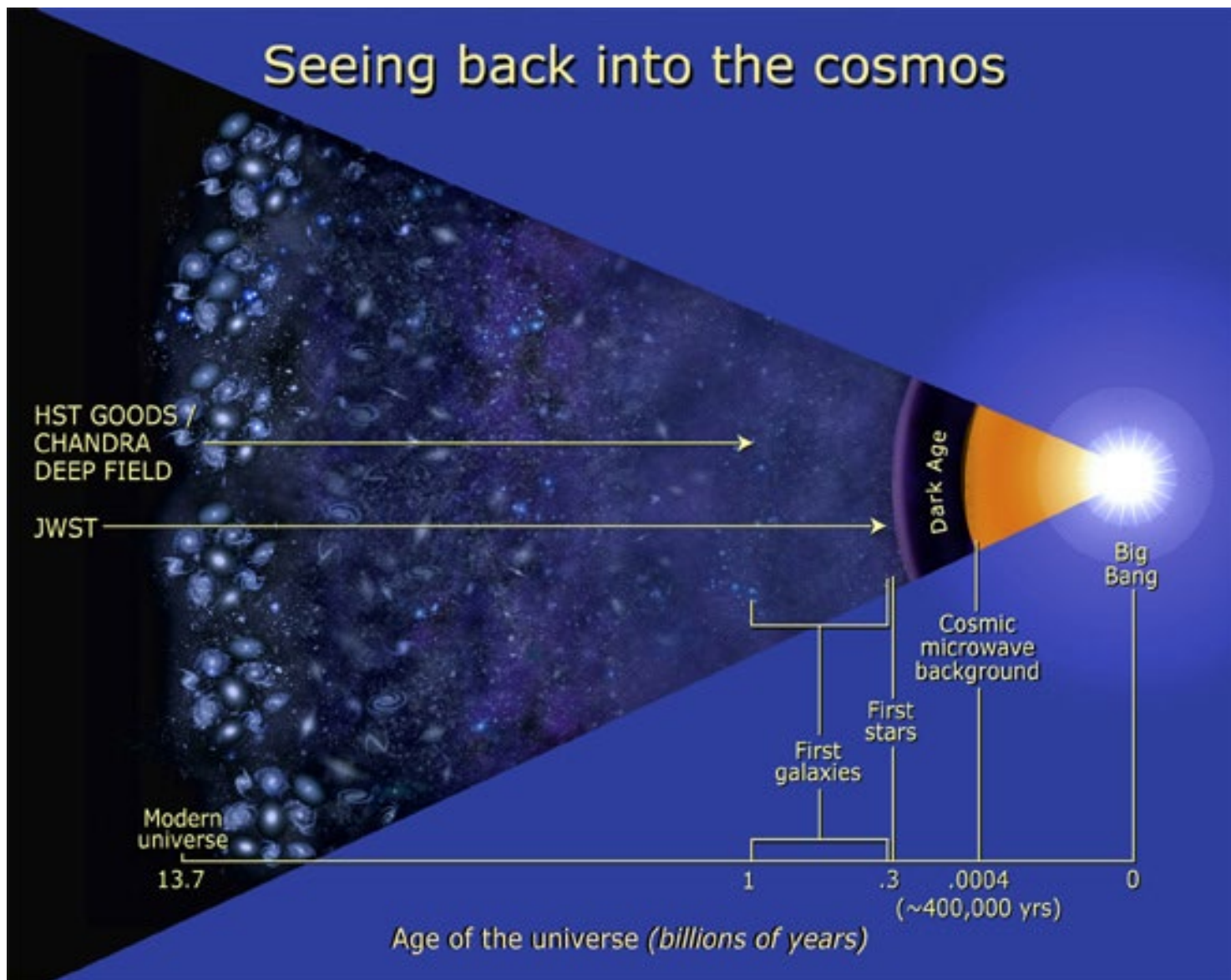


Webb will orbit the sun 1.5 million kilometers (1 million miles) away from the Earth at what is called the second Lagrange point or L2. (Note that these graphics are not to scale.)

https://en.wikipedia.org/wiki/List_of_objects_at_Lagrange_points#L2



Seeing back into the cosmos

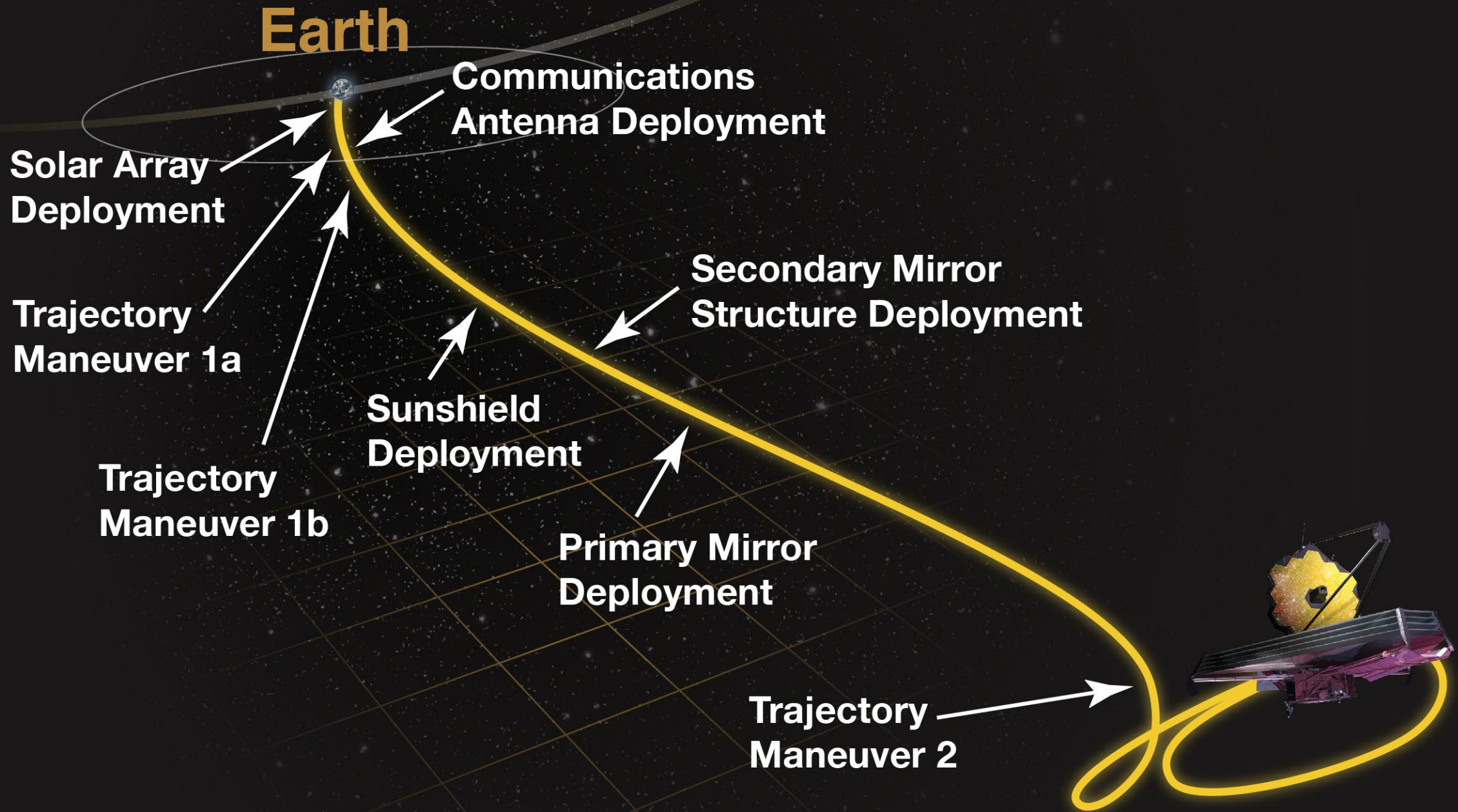




infrared image of the Andromeda Galaxy (M31) taken by Herschel (orange) with an X-ray image from XMM-Newton superposed over it (blue).

What About Herschel? 2009-2013

- ▶ The Herschel Space Observatory was an infrared telescope built by the European Space Agency - it too orbited the L2 point (where Webb will be).
- ▶ The primary difference between Webb and Herschel is wavelength range: Webb goes from 0.6 to 28.5 microns; Herschel went from 60 to 500 microns. Webb is also larger, with an approximately 6.5 meter mirror vs. Herschel's 3.5 meters.
- ▶ The wavelength ranges were chosen by different science: Herschel looked for the extremes, the most actively star-forming galaxies, which emit most of their energy in the far-IR. Webb will find the first galaxies to form in the early universe, for which it needs extreme sensitivity in the near-IR.



James Webb Space Telescope Delivers Splendid Star Image as Mirrors Align

- ▶ <https://www.cnet.com/news/james-webb-space-telescope-delivers-splendid-star-image-as-mirrors-align/>
- ▶ <https://www.space.com/jwst-nearly-halfway-through-mirror-alignment>
- ▶ Stars are getting sharper in the James Webb Space Telescope's field of view.
- ▶ The team recently completed the third of seven planned steps to align the 18 hexagonal segments of Webb's mirror, marking nearly the halfway point in a complex, weeks-long process.
- ▶ The second and third stages were respectively called segment alignment and image stacking, representing larger movements of the main mirror. Subsequent stages will make more minute adjustments to take an image of a distant star and gradually bring it to a single, precise point, NASA said in a statement Friday (Feb. 25).

COMPLETED IMAGE STACKING



Courtesy Steve Holmes and LLBMO

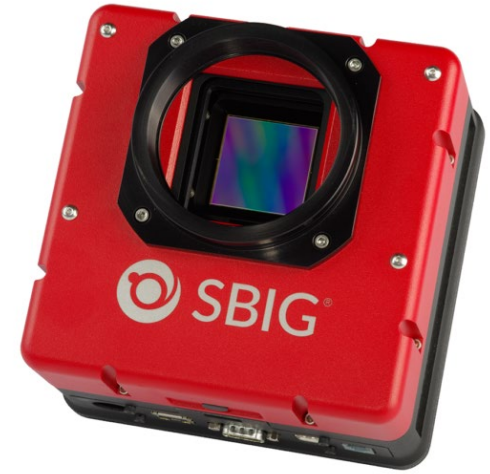


LLBMO

- ▶ Location Lucknow – REMOTE observatory
- ▶ STX 16803 with the FW-7. All Baader filters.
- ▶ Large format camera. 16 megapixel CCD with 9 micron pixels. Supports options including FW7-STX 7 position Filter Wheel
- ▶ Takahashi FSQ-106EDX4 Quadruplet Refractor Astrograph

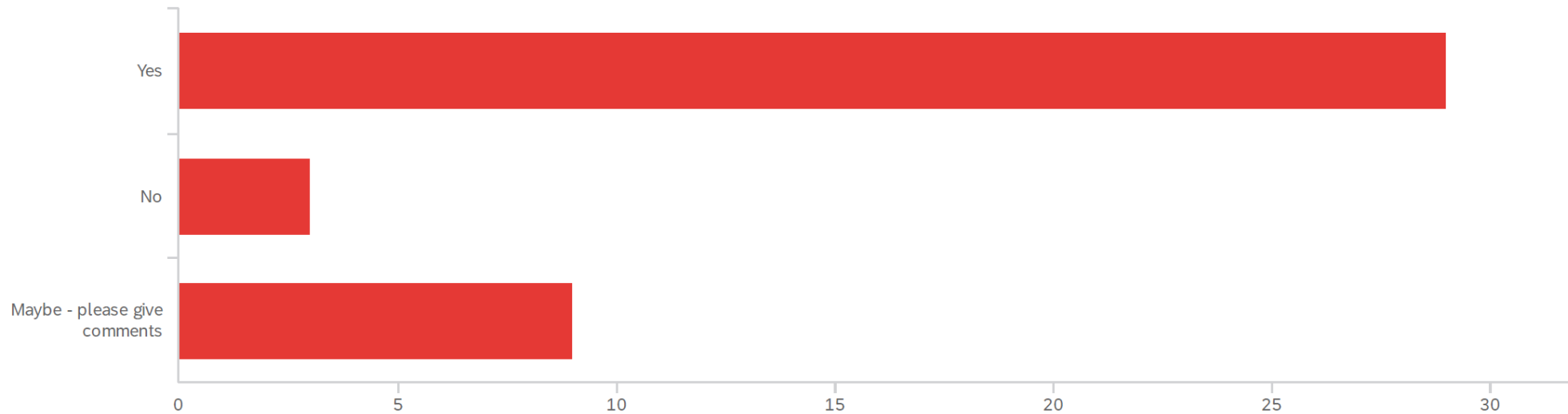
Future

- ▶ Officina Stellare Veloce RH 250-AT F/5.6

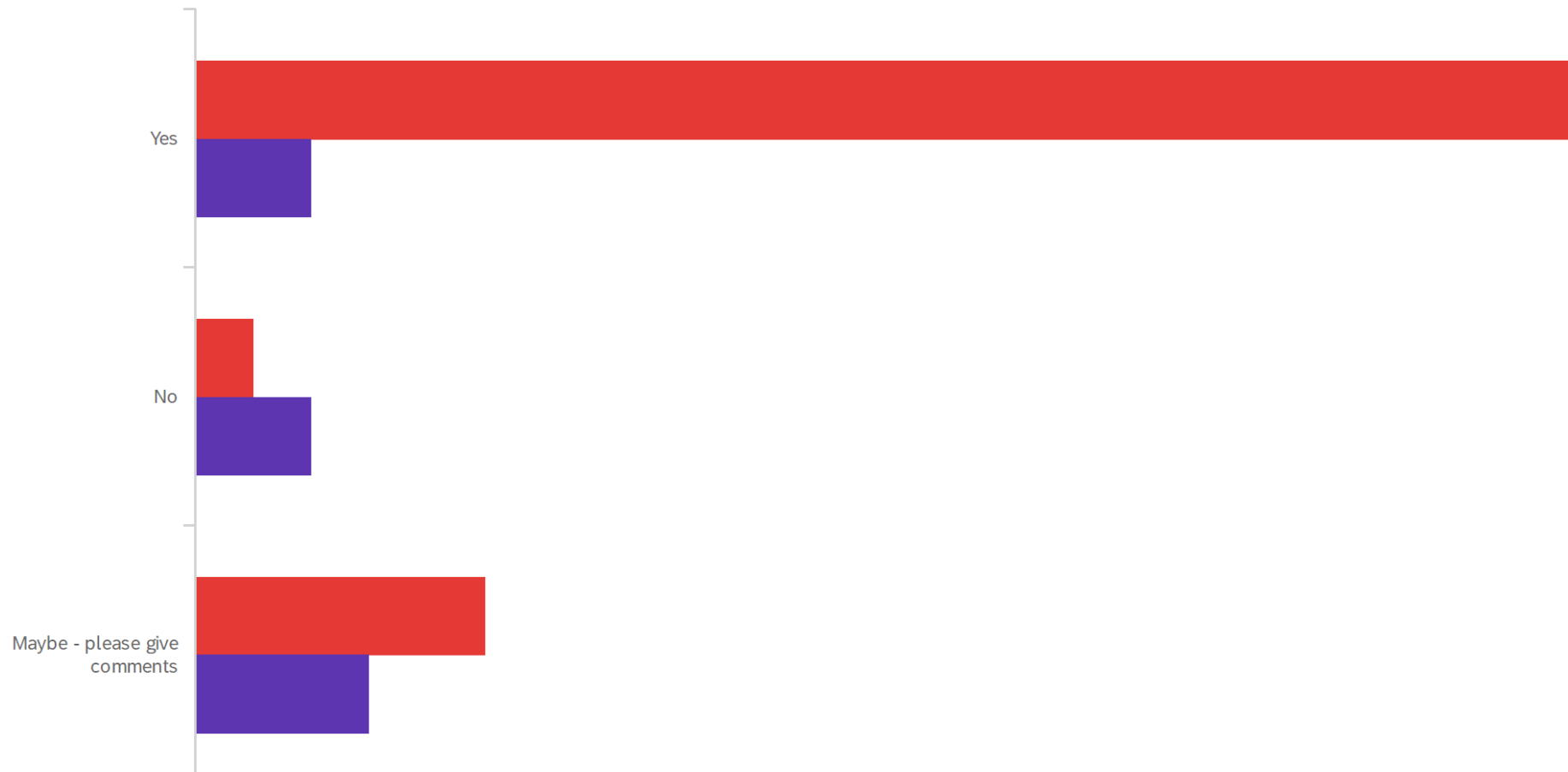


Survey 40 responses (160 in club)

Q1 - Q1 - I would be in favor in the club moving ahead with this project!



Q2 - Q2 - For those who are unfamiliar with astro imaging and data manipulation , Steve and others have offered to provide some instruction. Would you be interested? This may help to answer the next questions re support!



Subscription model - \$



#	Field	Yes	No	Maybe - please give comments	Total
1	\$200 per year (20 members to provide sustainability)	66.67% 4	0.00% 0	33.33% 2	6
2	\$100 per year (40 members to provide sustainability)	84.62% 11	0.00% 0	15.38% 2	13
3	\$50 per year (80 members to provide sustainability)	83.33% 5	0.00% 0	16.67% 1	6
4	another amount and comments?	57.14% 8	14.29% 2	28.57% 4	14

Showing rows 1 - 4 of 4

Plan

- ▶ Club very interested in moving forward.
- ▶ Great interest in Astro imaging and processing instruction
- ▶ Dichotomy astrophotography vs Observing
- ▶ \$100 per year is the most popular pricing.
- ▶ From the comments
 - ▶ Need complete details of what is offered for the cost.
 - ▶ Need to balance price with what is offered
 - ▶ Some NOT in favour of any club funds being used.
 - ▶ Tiered model may work but many more details needed – is there “sweet spot” that satisfies most concerns.

Plan continues

- ▶ From Committee meeting
 - ▶ From survey and interest - The club is willing to move forward
 - ▶ Need to weight astrophotography vs observers and develop plan to satisfy as many as possible.
 - ▶ Details needed around a subscription plan.
 - ▶ Options
 - ▶ data (some available now – procedure for sharing)
 - ▶ Remote astrophotography target selection (and possibly telescope control)
- ▶ From board meeting Monday night
 - ▶ Jim and committee to come back with a detailed plan
 - ▶ Option for another survey to pinpoint the details.

National RASC Update.

- ▶ RASC National Office moving
 - ▶ 203-489 College Street
 - ▶ We needed less an office, and more of a public space, including the Dorner instrument museum, display space, and for public outreach activities.
- ▶ Volunteer screening/security
 - ▶ Volunteer best practices
 - ▶ Code of conduct
- ▶ Insurance FAQ
- ▶ Future Gas
- ▶ Website
- ▶ Bylaws – RASC National representative
- ▶ Total Eclipse 2024

