

The Quest for Understanding Star-Formation and Galaxy Growth with JWST

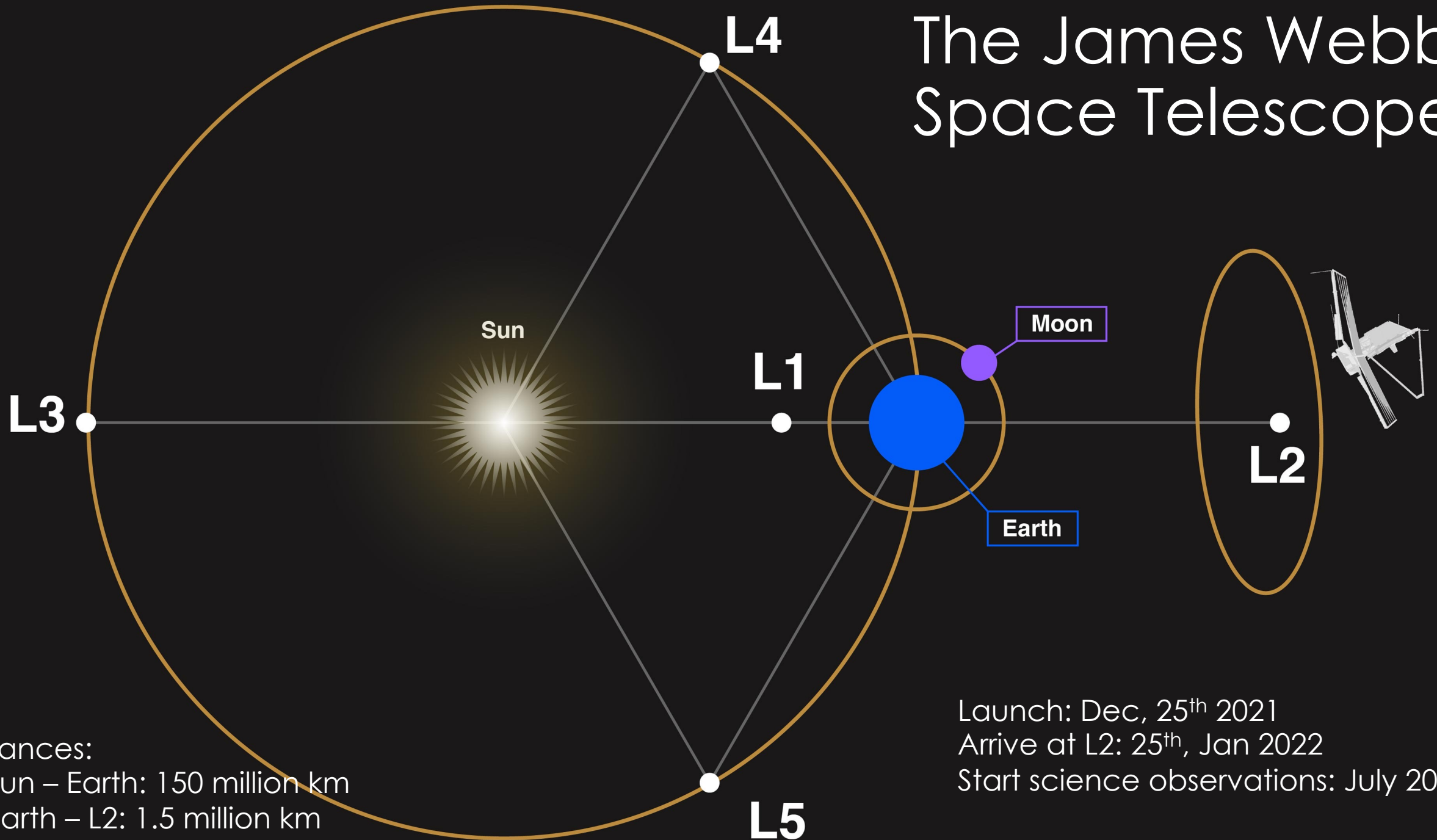


Aurélien LE BAIL

PhD student – CEA-Saclay – Université Paris-Saclay – ED127



The James Webb Space Telescope



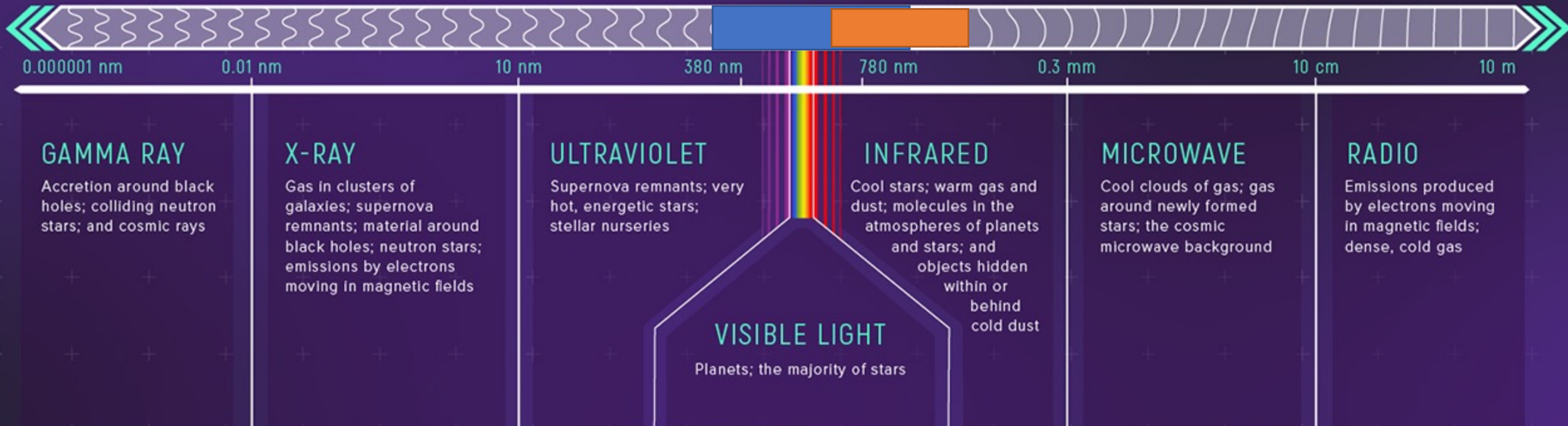
Distances:

- Sun – Earth: 150 million km
- Earth – L2: 1.5 million km

Launch: Dec, 25th 2021
Arrive at L2: 25th, Jan 2022
Start science observations: July 2022

The James Webb Space Telescope

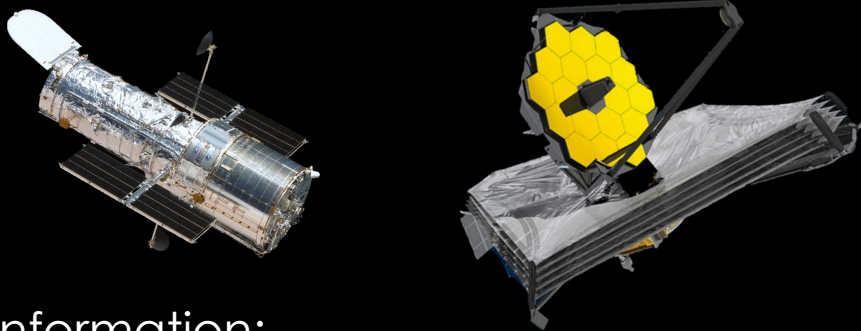
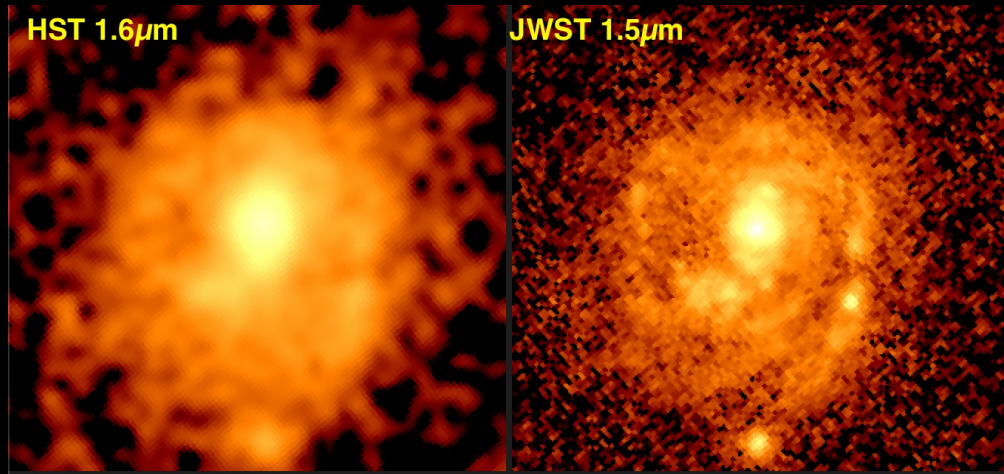
DIFFERENT WAVELENGTHS OF LIGHT (and what you can observe with them)



HST vision: from 200nm to 1.7 μ m

JWST vision: from 600nm to 28.5 μ m

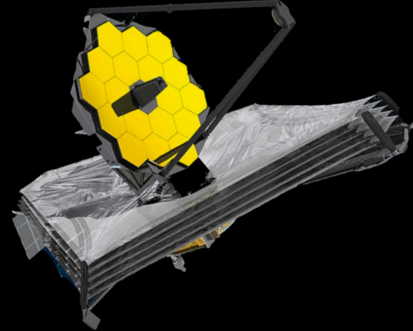
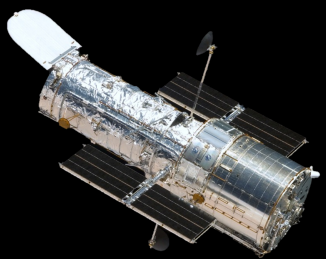
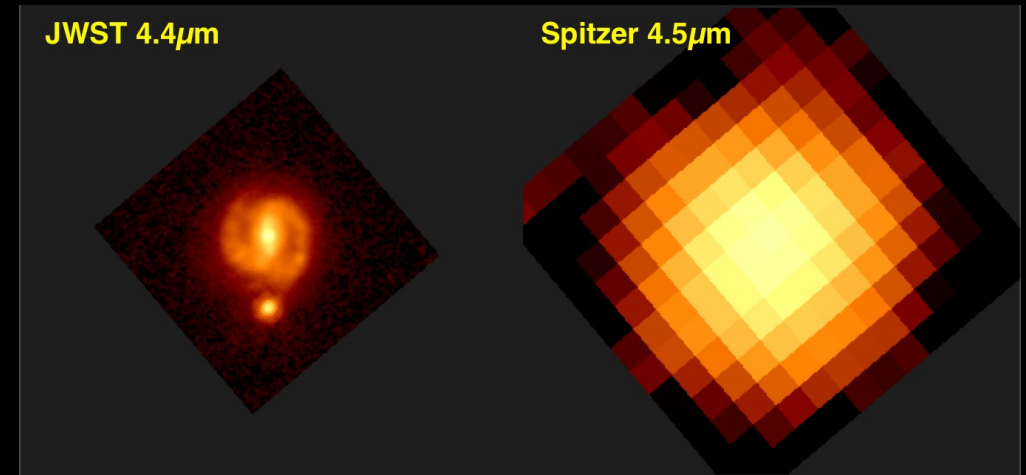
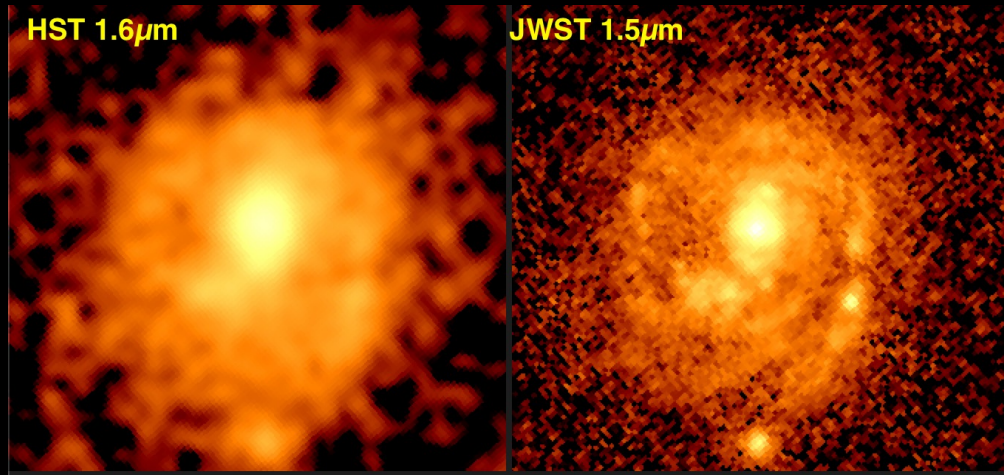
JWST extraordinary resolution power



Galaxy information:

- 2" wide (17kpc = 55k light-years ~half the size of Milky way)
- Distance: 10.5 billion light-years

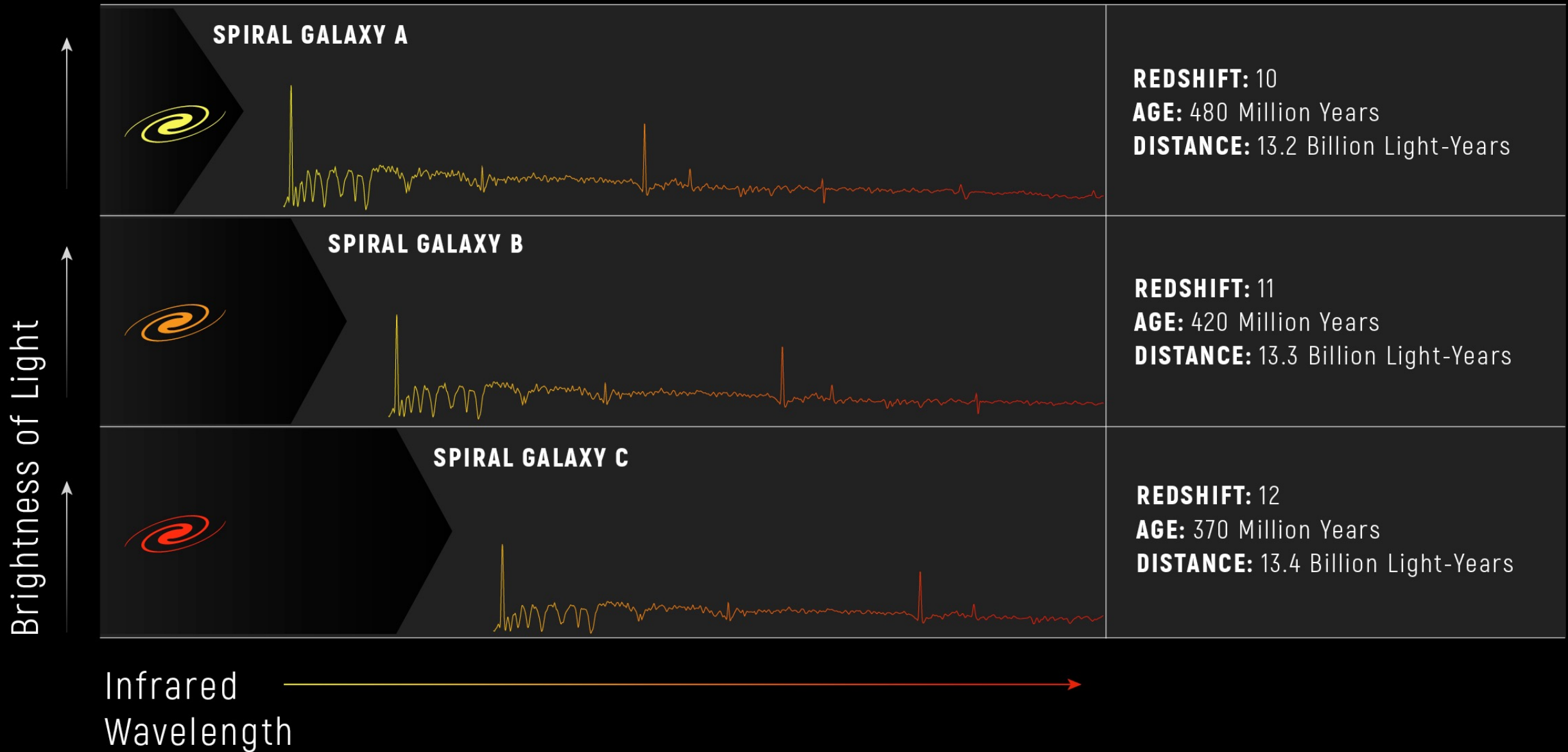
JWST extraordinary resolution power



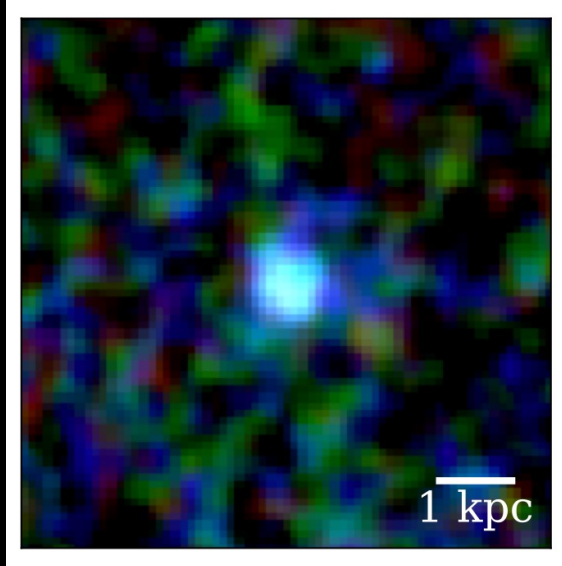
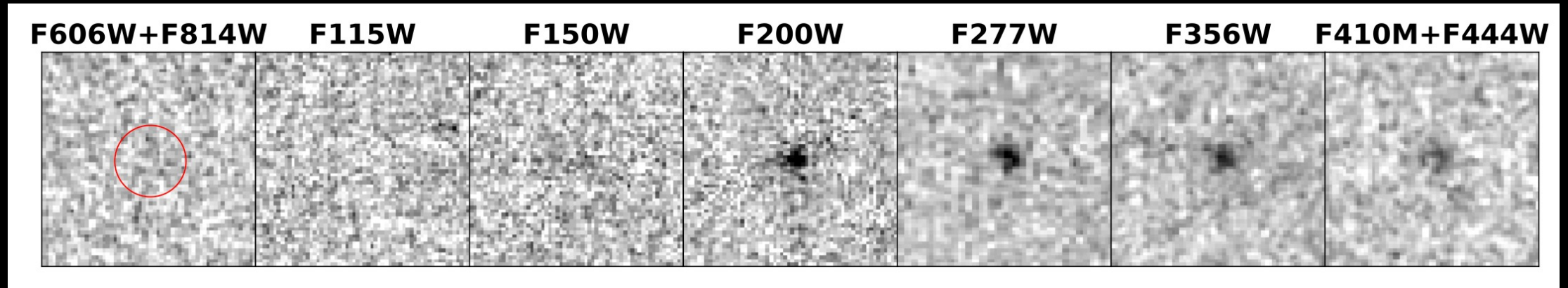
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JWST 1st results: Farthest galaxies



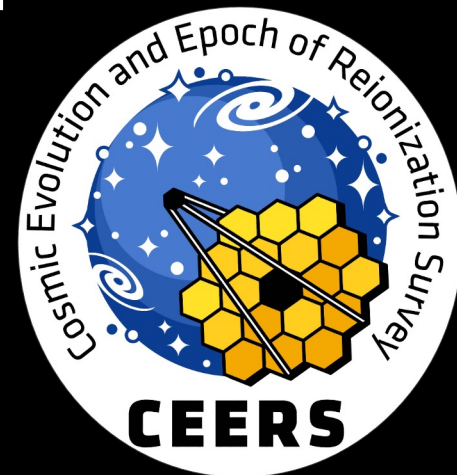
JWST 1st results: Farthest galaxies



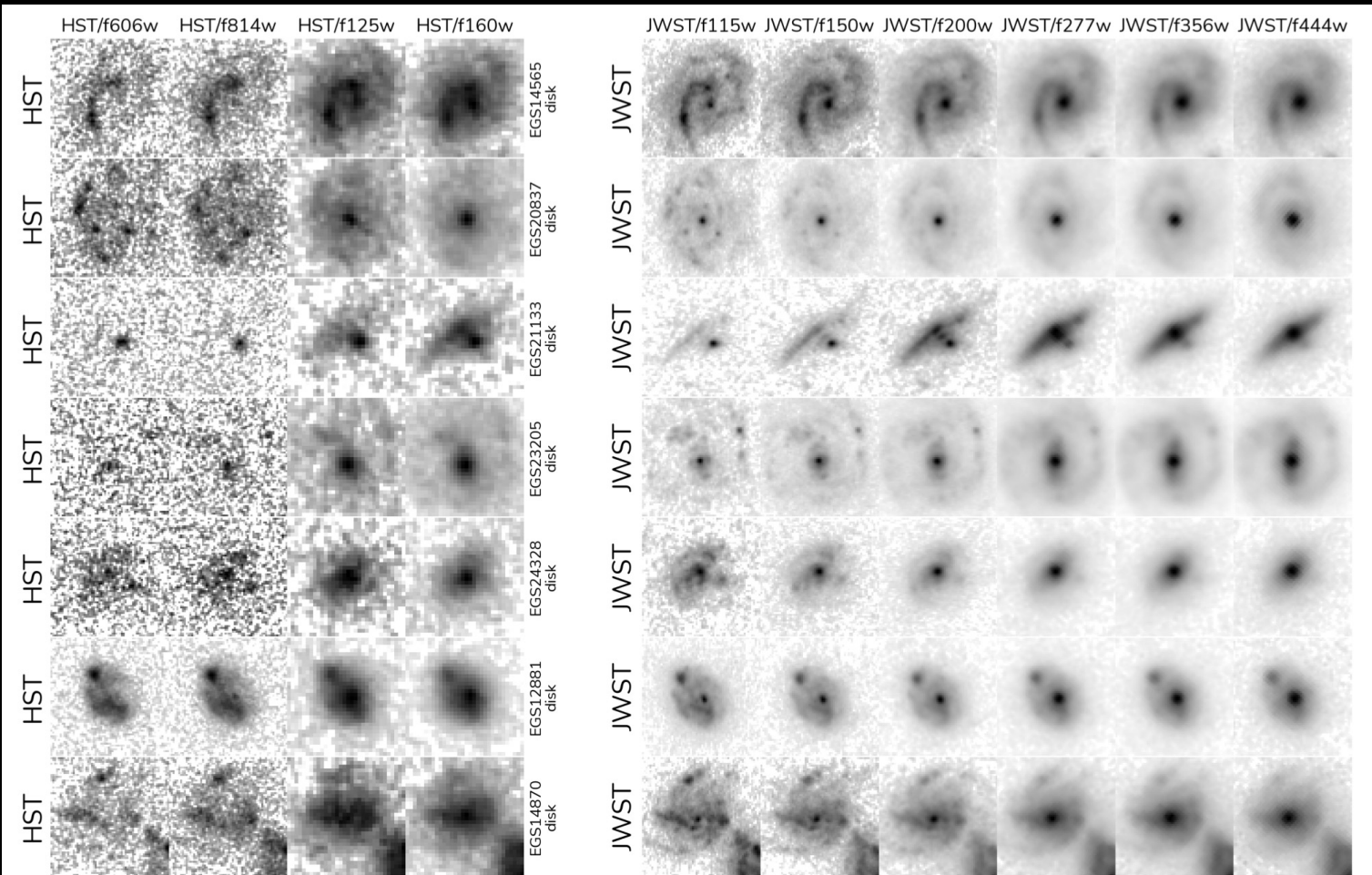
“Real color” RGB image

Maisie's Galaxy (Finkelstein et al. 2022):

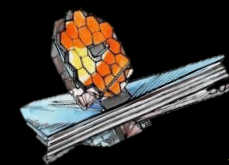
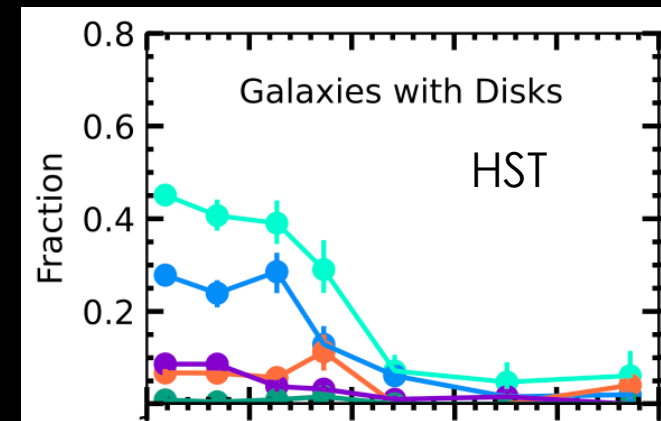
- ~200 times lighter than the Milky Way
- Forms ~20% more stars per year than the Milky Way
- $z = 12$
- The universe was less than 370 Myrs at the time



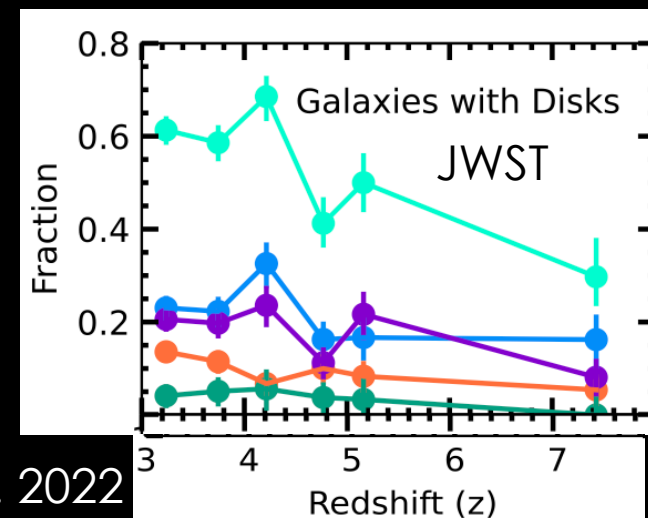
Hubble sequence: Galaxy spiral/disk or elliptical



Ferreira et al. 2022

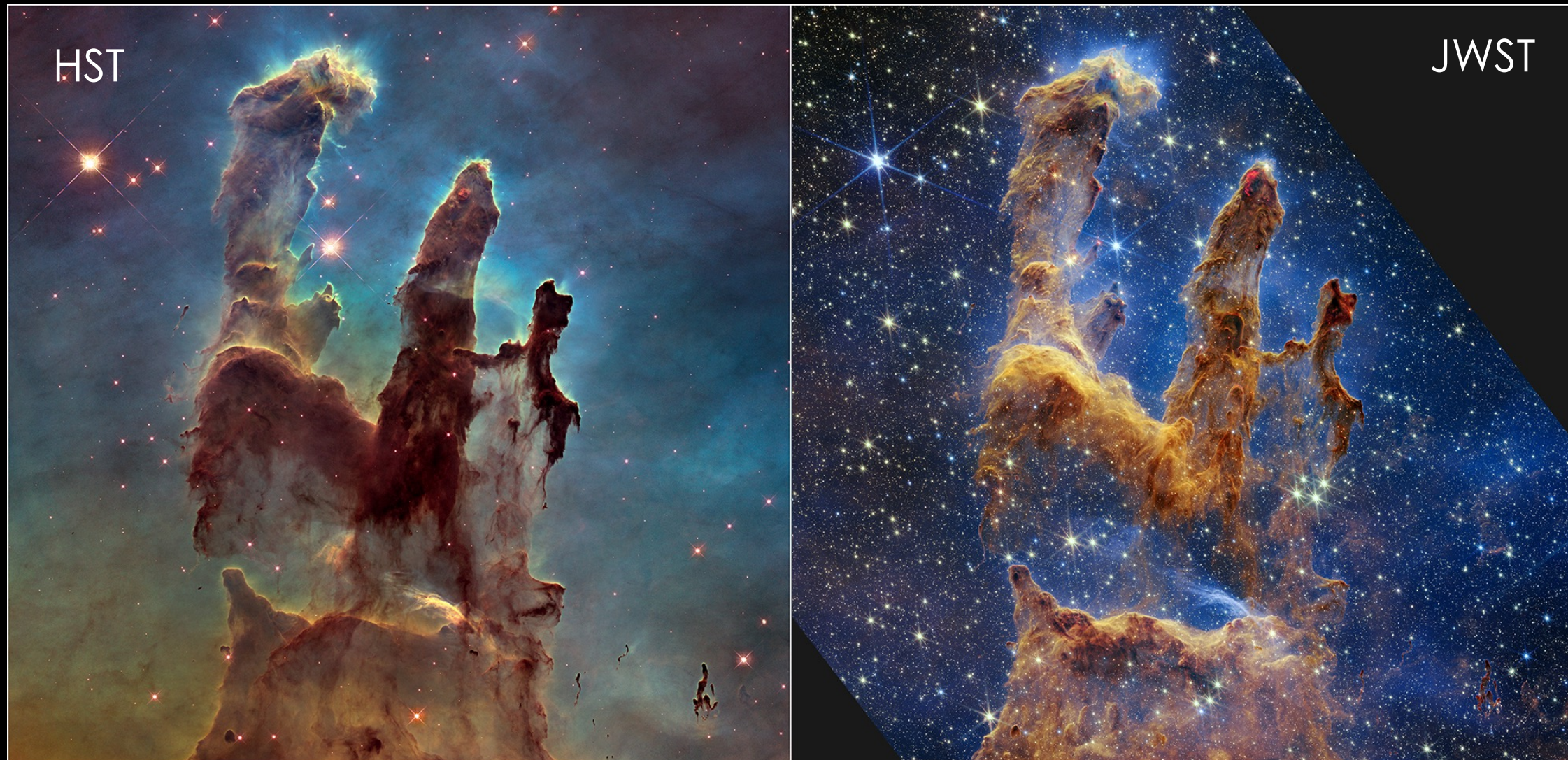


From HST to JWST: More disks than previously thought, especially at high z



Kartaltepe et al. 2022

My work: JWST reveals hidden Star Formation



My work: JWST reveals hidden Star Formation

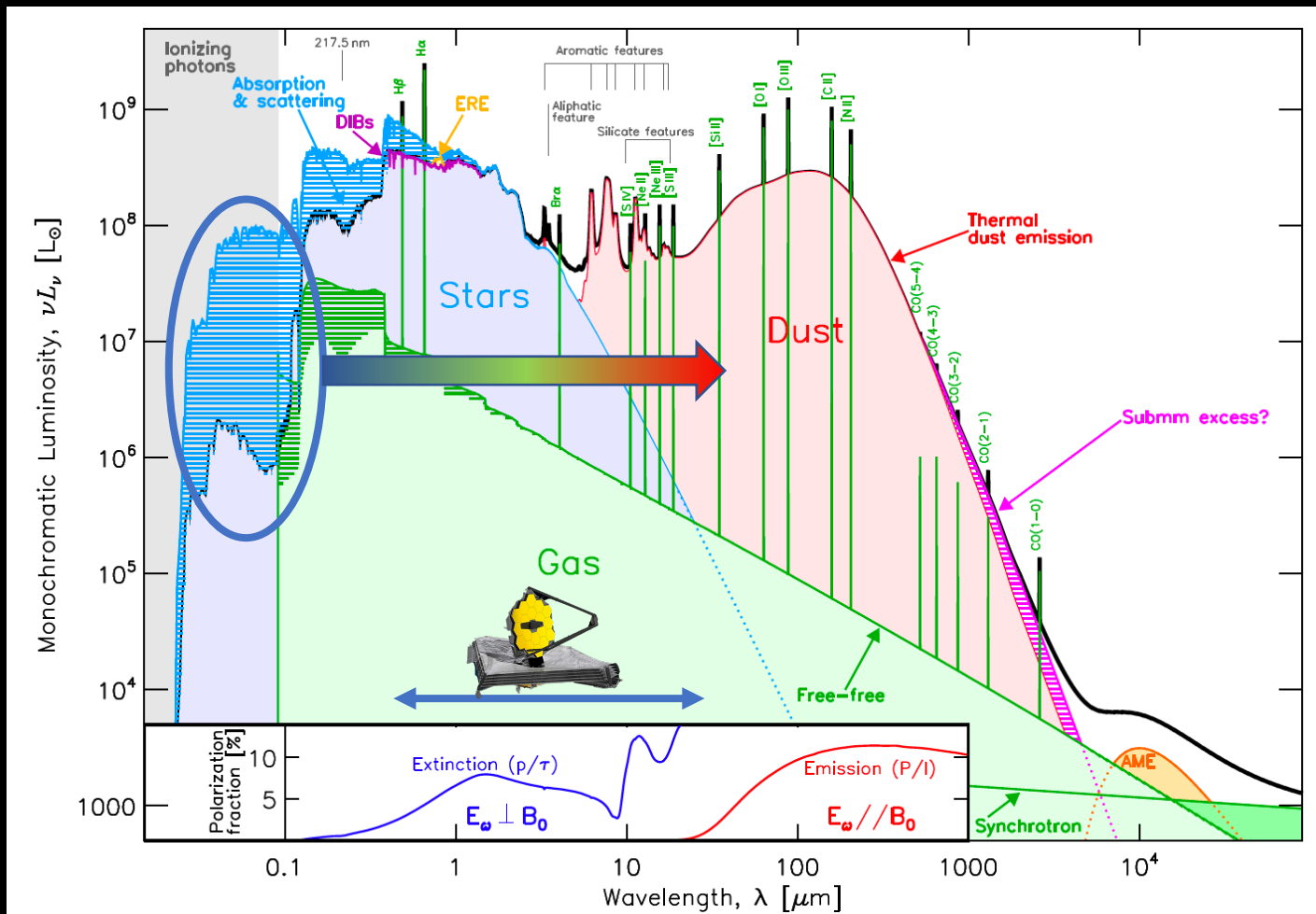
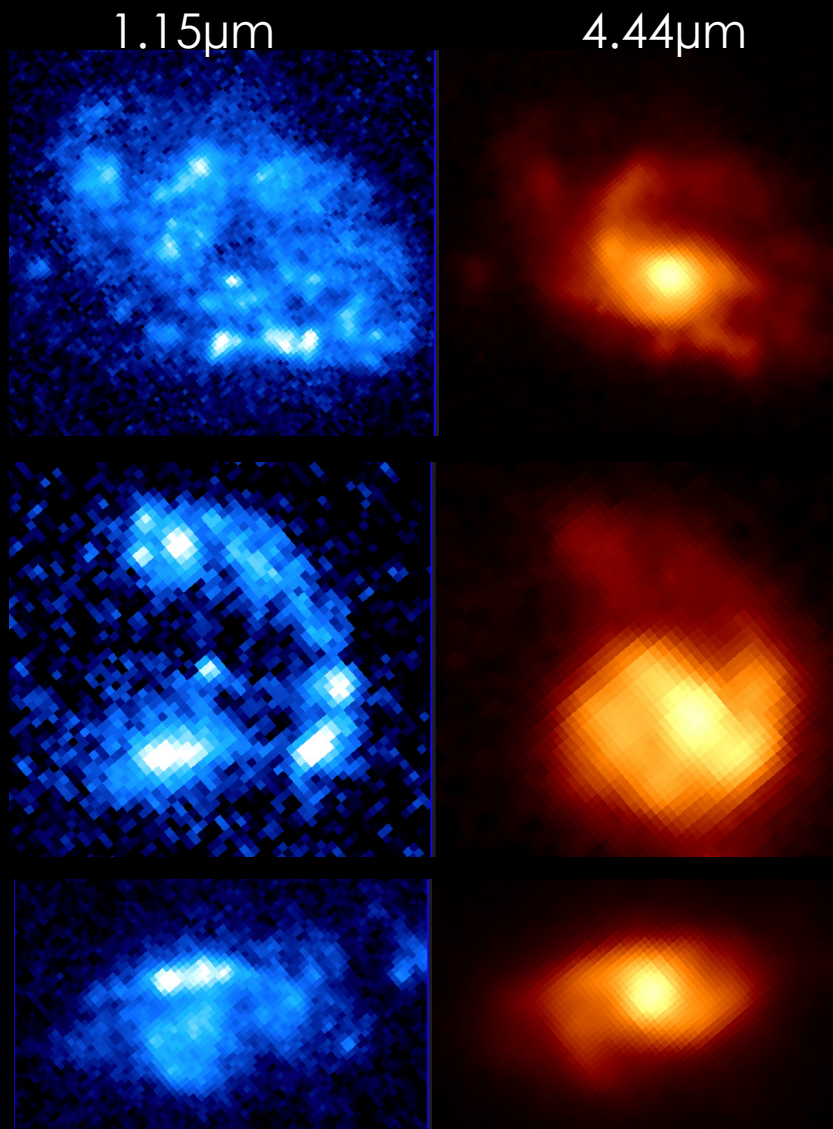


Figure 1

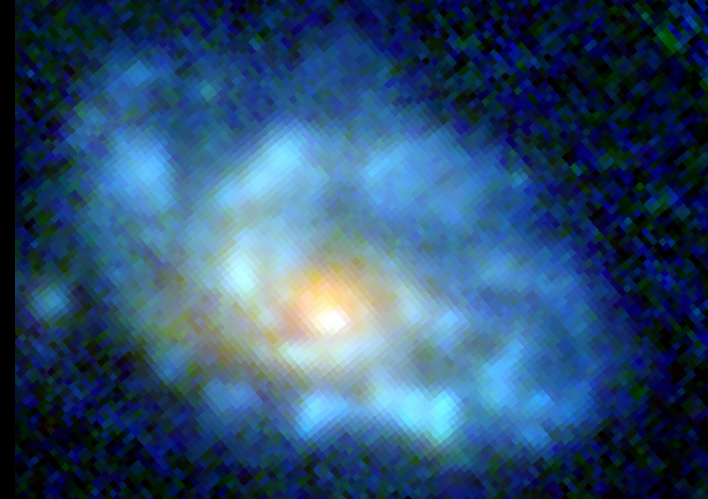
Spectral energy distribution (SED) of a typical late-type galaxy. The blue hatched area shows the power absorbed by dust. We show typical Diffuse Interstellar Band (DIB), Extended Red Emission (ERE) and Anomalous Microwave Emission (AME) spectra, with the most relevant gas lines. The inset shows the model D of Guillet et al. (2017, $G_0 = 100$).



Local vs Distant galaxies



60 millions light-years away (HST)

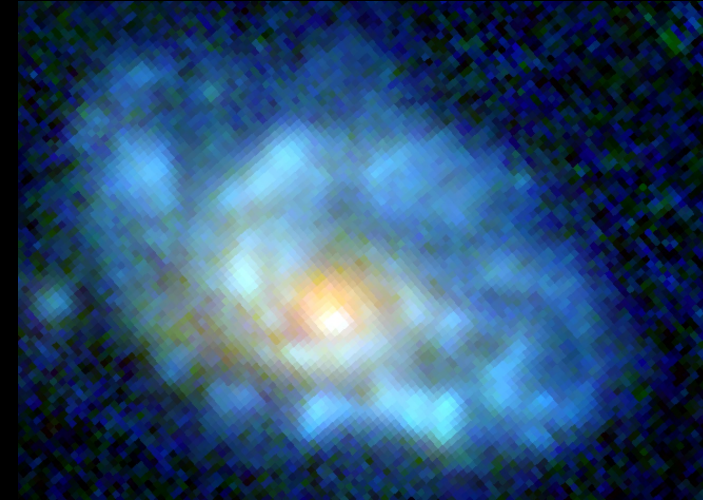


10 billions light-years away (JWST)

Local vs Distant galaxies



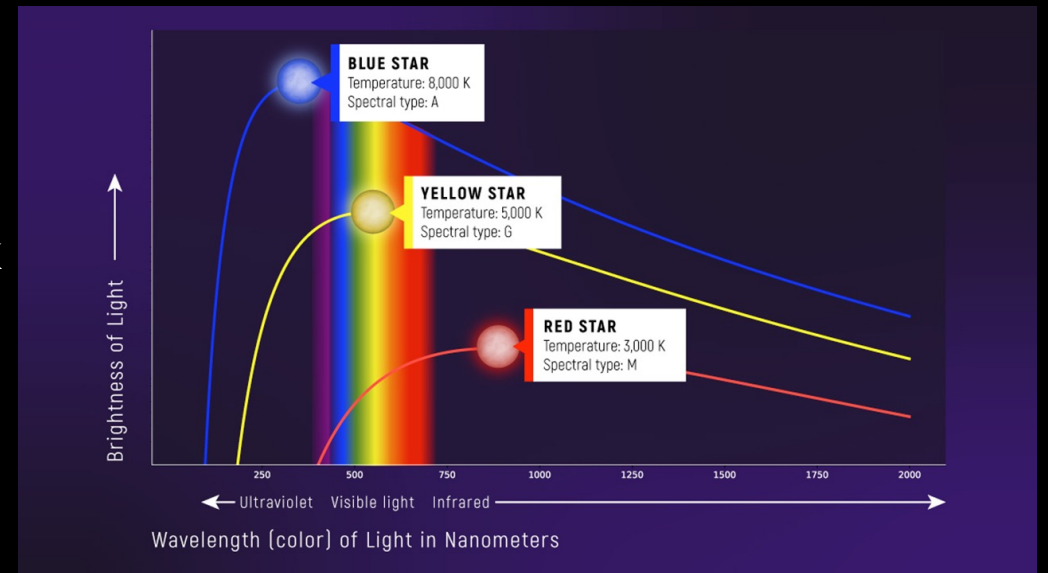
60 millions light-years away (HST)



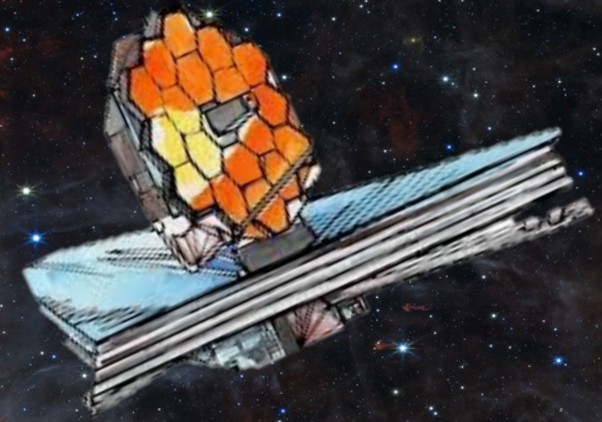
10 billions light-years away (JWST)

Local galaxies: Old stars in the Bulge
+ Young stars in the Disk

Distant galaxies: Dusty Bulge + Non-dusty Disk



Take-home message



Questions ?

JWST reveals the IR universe:

- sees the farthest galaxies
- Disk galaxies formed early
- Dusty Star Forming Galaxies have a compact hidden core
- Gradient of colour due to age in local galaxies but to dust in distant galaxies
- Distant galaxies are highly star-forming

Credit images:



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