First Five Images from James Webb Space Telescope

Anand
Club Phoenix
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Changing Age and Size (diameter) of the Universe (1919-2006)
One light year is 6 trillion miles
Can we get any new info from Webb telescope ?

1919
Age: Infinite
Size: 300,000 Light Years
Telescope: Mt.Wilson

1929
Age: 2 Billion Years
Size: 280 Million Light Years
Edwin Hubble's estimate

1955
Age: 6 Billion Years
Size: 4 Billion Light Years
Telescope: Mt.Palomar

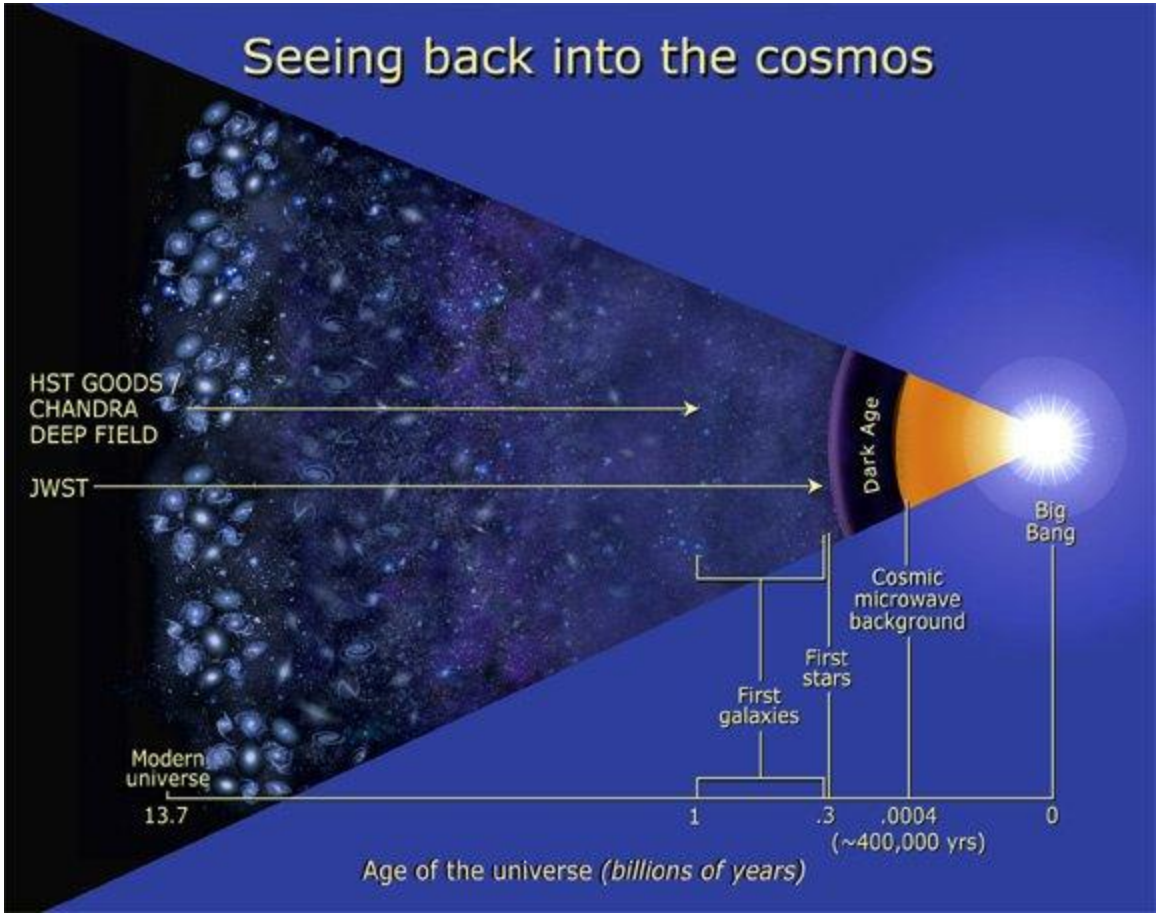
1965
Age: 10-25 Billion Years
Size: 25 Billion Light Years
Based on Quasars

1993
Age: 12-20 Billion Years
Size: 30 Billion Light Years

2006
Age: 13.7 Billion Years
Size: 94 Billion Light Years
Telescope: Hubble

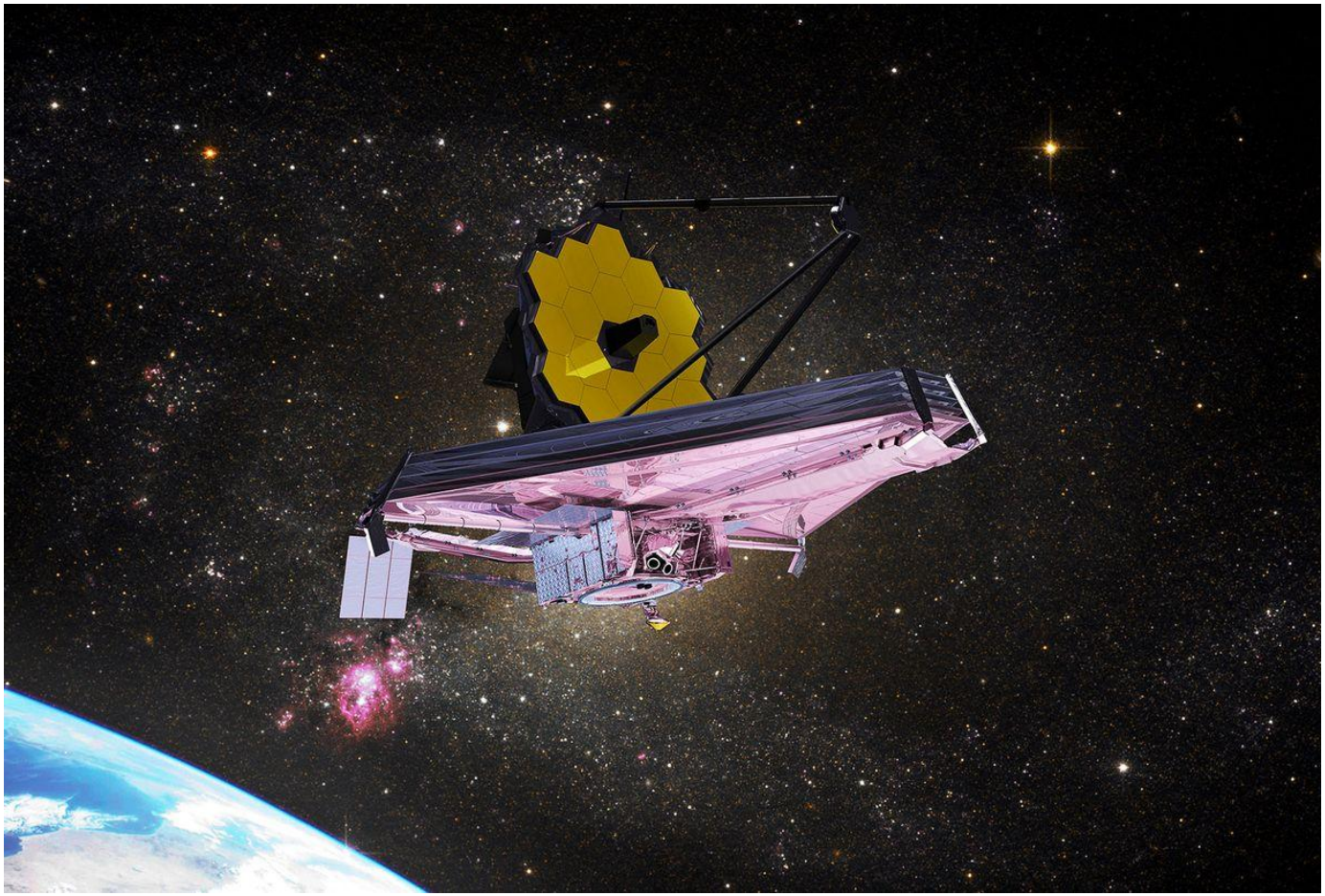
Reference for 1919-2006 estimates:
https://imagine.gsfc.nasa.gov/educators/programs/cosmictimes/educators/guide/age_size.html

2022-2042
James Webb Space Telescope
Age:?
Size:?



- GOODS- combines Hubble, Spitzer and Chandra Observatory Images
- HST- Hubble Telescope launched in 1990, UV, Visible and near Infra Red
- Chandra- Observatory launched in 1999, X-Ray
- JWST- James Webb Space Telescope, launched 2022, Infra Red
- JWST allows us to photograph first galaxies formed from 0.3 – 1 billion years after Big Bang. See figure.

James Webb Space Telescope



- $10 Billion; 20 Years of work by Scientists and Engineers
- 18 Mirrors- Kept cold to get Infrared Image from outer space
- Engineering Marvel
- Designed to work for 20 years at 1 million miles away

JWST Dateline

- 25 December 2021: liftoff at 12:20 UTC.

- 24 January 2022: JWST arrives at final orbit around the second Sun-Earth Lagrange point, or L2, nearly 1 million miles away from the Earth.

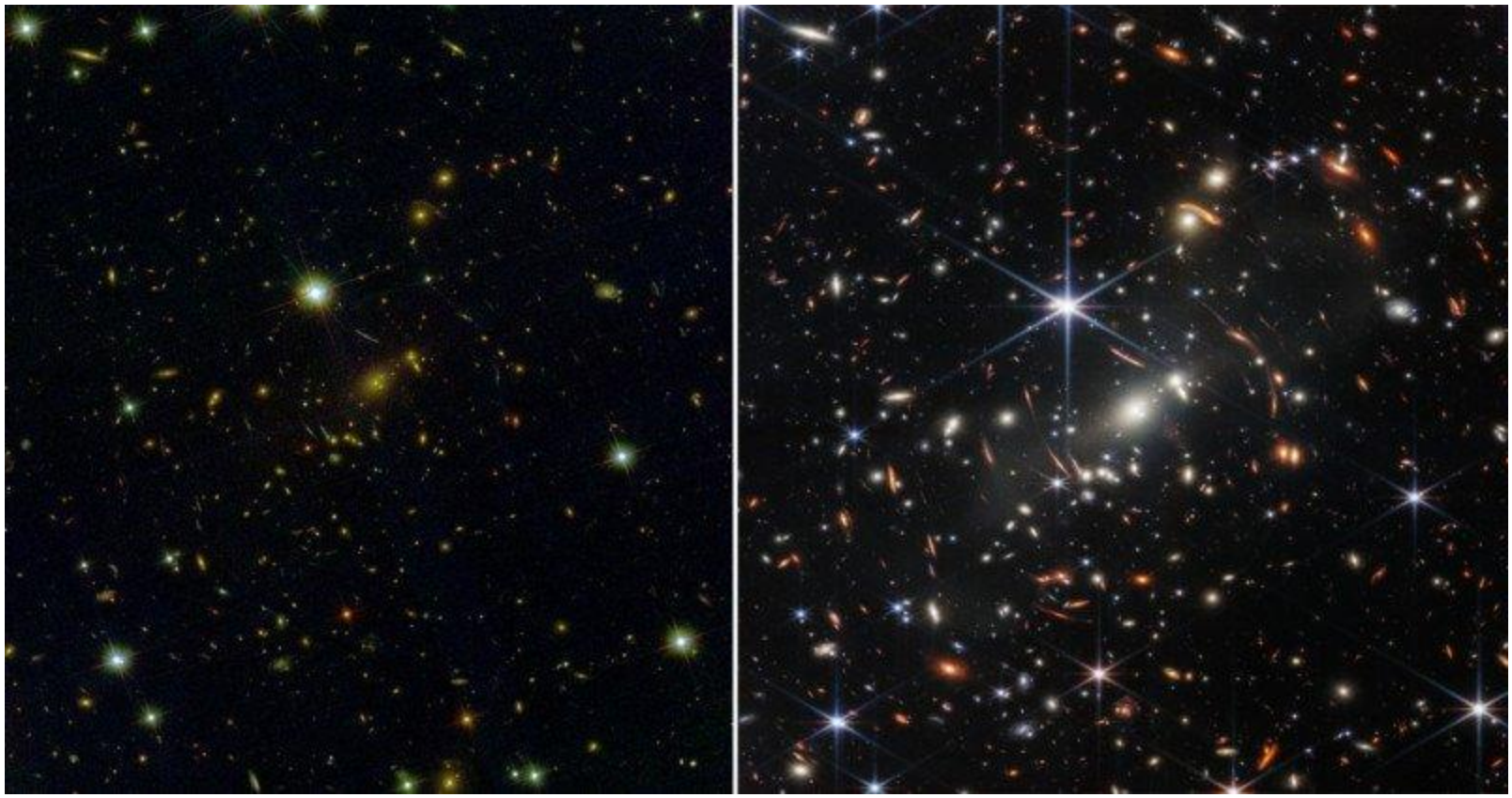
- 11 July 2022: JWST has completed its commissioning activities and is ready to begin full scientific operations.

- 12 July 2022: JWST's first full-color images and spectroscopic data were released during a televised broadcast at 10:30 a.m. EDT (14:30 UTC) on Tuesday, July 12, 2022, from NASA's Goddard Space Flight Center in Greenbelt, Maryland.

1. SMACS 0723- IR Image from dark space- captured by 18 mirror JWST

Webb's first Deep Field image-
Southern sky; Constellation – Volans; 5-13(front-back) Billion light years away
We are looking at a patch of sky, size of a grain of sand held at arm's length
Hundreds of galaxies clearly seen; each with billions of stars
Some galaxies are stretched by gravity like Salvador Dali's Melting Pocket Watch!

Comparison of Hubble Vs Webb Images

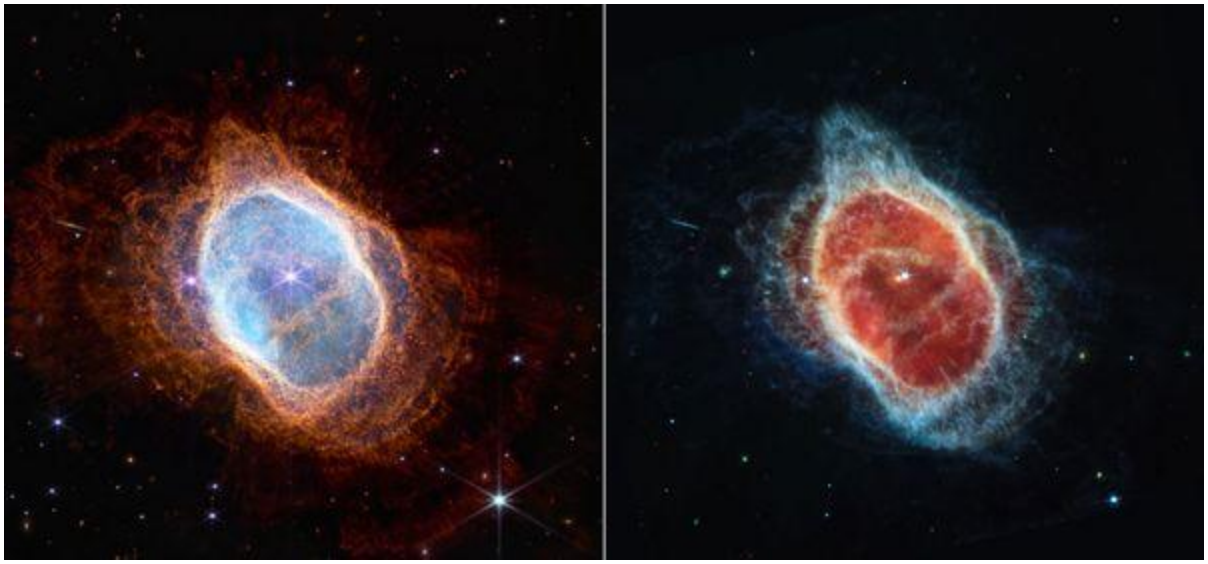


HST (Hubble) JWST (Webb)

- Clarity is achieved by size of the telescope, lot bigger than Hubble.

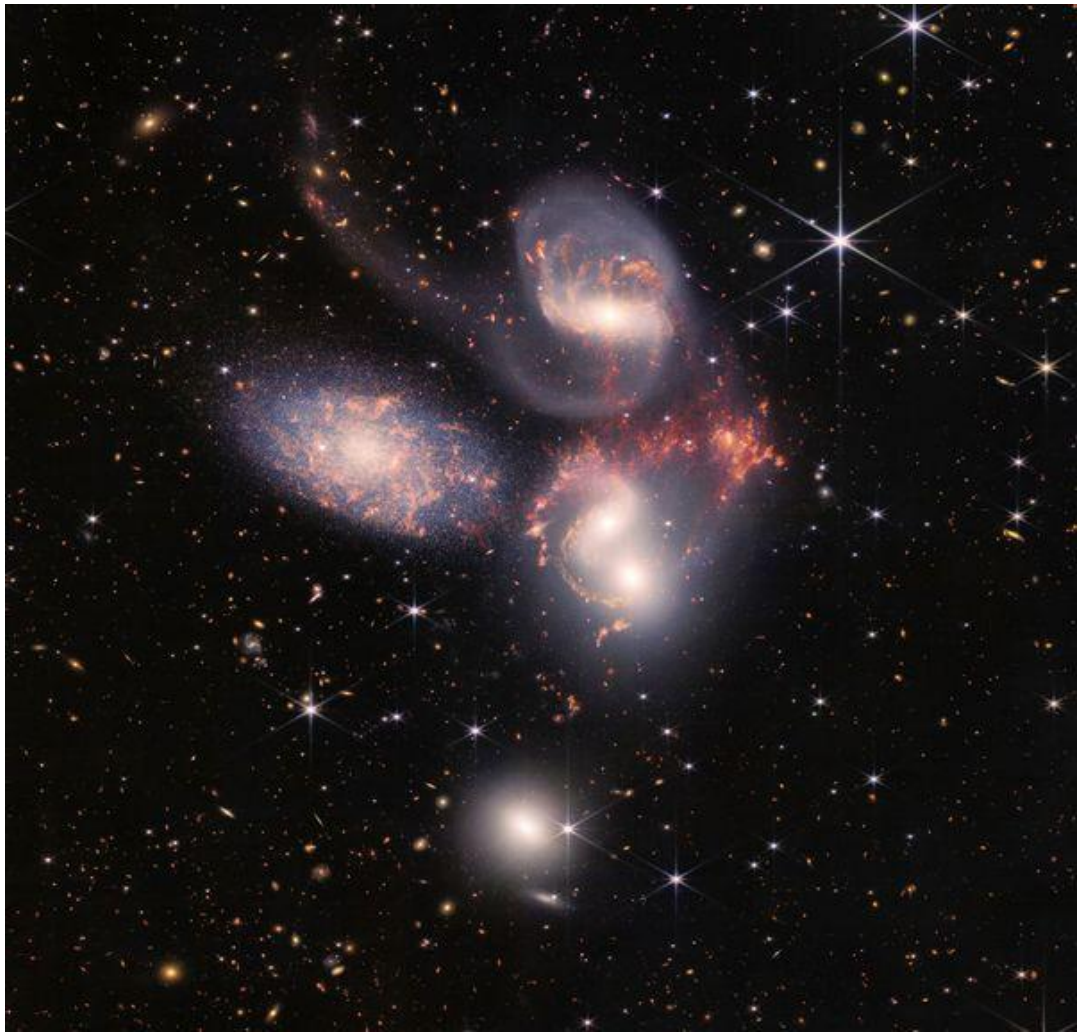
- Also some galaxies in the front act like gravitational lens and bend the light from farther galaxies to reach the telescope! Einstein predicted bending of light due to gravity.

2. The Southern Ring Nebula



Sothern sky; constellation- Vela
2500 light years away
Dying star
Double stars seen in the right side image

3. Stephan's quintet

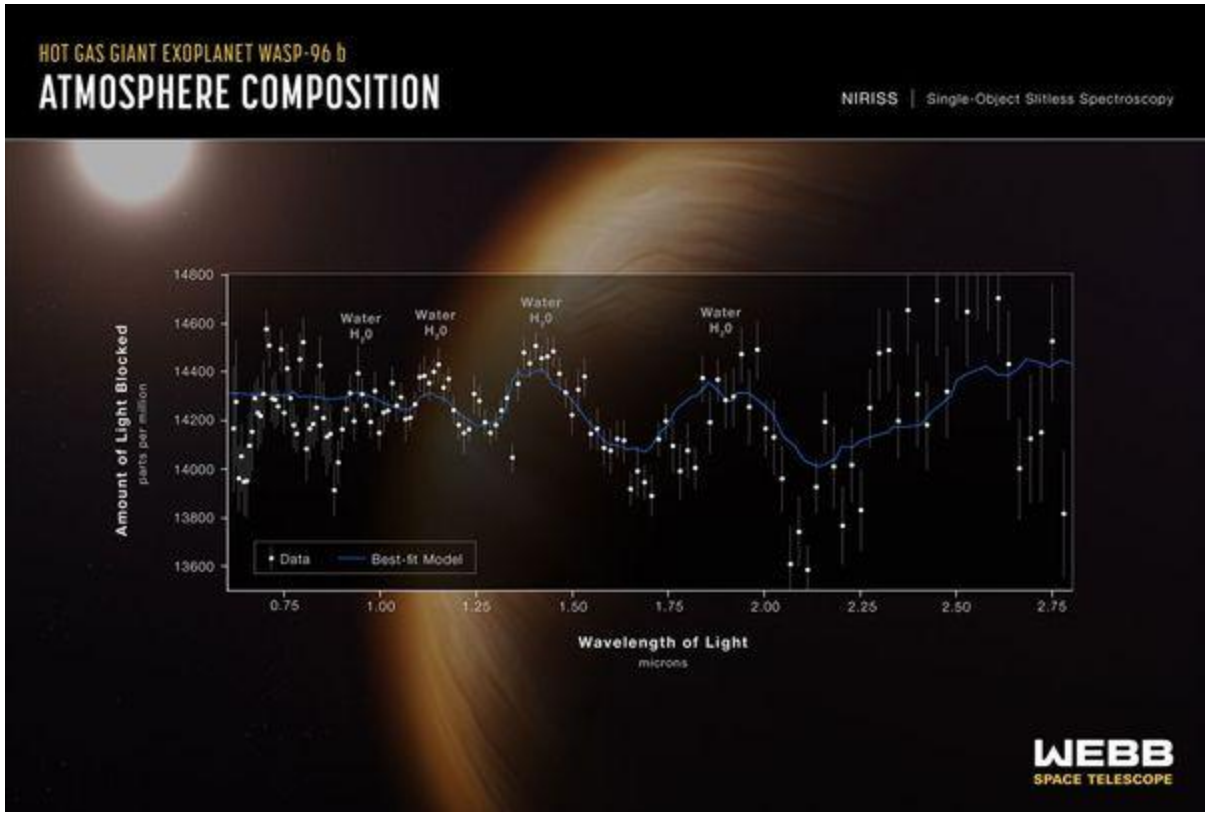


Five galaxies in Pegasus Constellation
290 Million miles away
Edouard Stephan discovered it in 1877

4. Carina Nebula

Cosmic cliff region of Carina Nebula
It is in our Milky Way; constellation Carina
7500 light years away
Contains dead stars and newly born stars
Hitherto invisible areas of star formation seen with Webb image

5. WASP-96 b (spectrum)



Exoplanet (planet that can sustain life); Southern sky;
in Constellation Phoenix
Star WASP-96; Exoplanet WASP-96b; 3.5 earth days for one revolution ;
1000 light years away
Analysis of atmosphere for water, carbon and oxygen
Webb can look for life in outer space

Informative Videos

Nova Program aired July 13, 2022 in PBS Channels; 53 min

https://www.pbs.org/wgbh/nova/video/ultimate-space-telescope/

Fraser Cain- Amateur Astronomer Explaining the Images; 17 min

https://www.youtube.com/watch?v=0VNQ6_hSA8o

Description of the Images by Time

https://time.com/6196675/five-james-webb-telescope-images-explained/

WE DON’T KNOW WHAT WE ARE GOING TO SEE

BUT

WE HAVE’NT SEEN ANYTHING LIKE THIS BEFORE

- JWST Researcher