

NISE Network Online Workshop

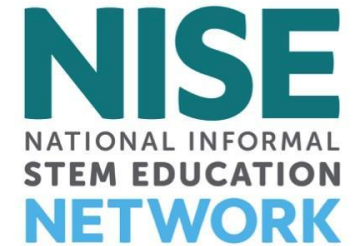
One Year of Science and Discovery with the Webb Space Telescope

Tuesday, August 8, 2023

Today's Presenters:

Dr. Christopher Britt, Space Telescope Science Institute

Yesenia Perez, Space Telescope Science Institute



Welcome! As we wait to get started with today's discussion, please:

Introduce yourself! Type your name, institution, and location into the [Chat Box](#)

Questions? Feel free to type your questions into the [Chat Box](#) at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

Today's discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop



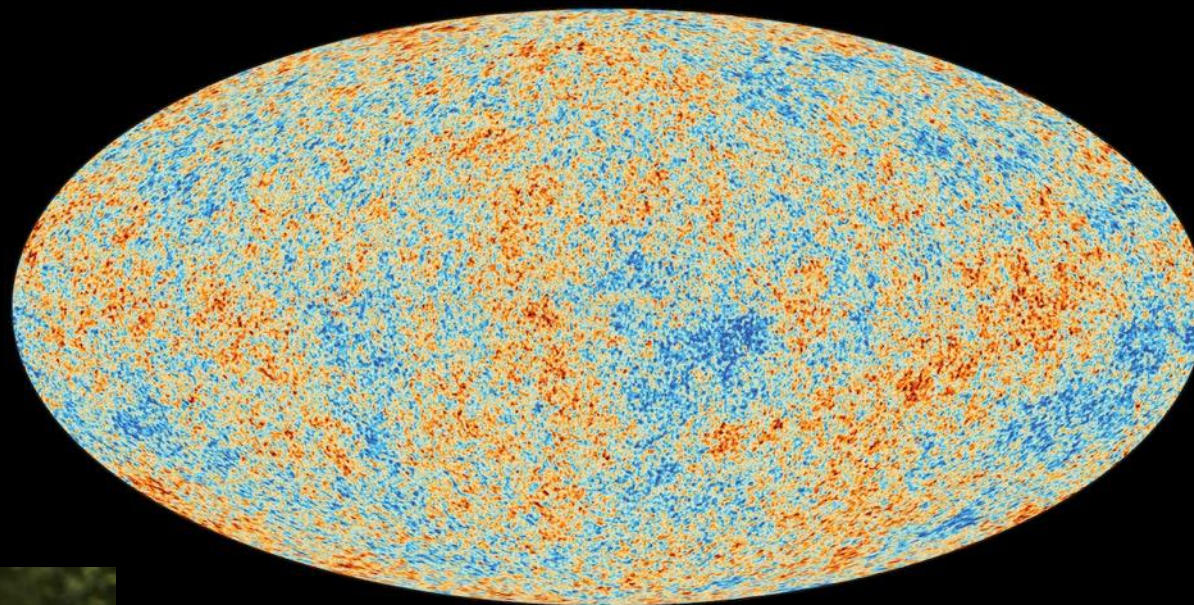
One Year of Science
with the

WEBB
SPACE TELESCOPE

August 8, 2023

The Story of Us

- How do we get from this:



Hydrogen & Helium

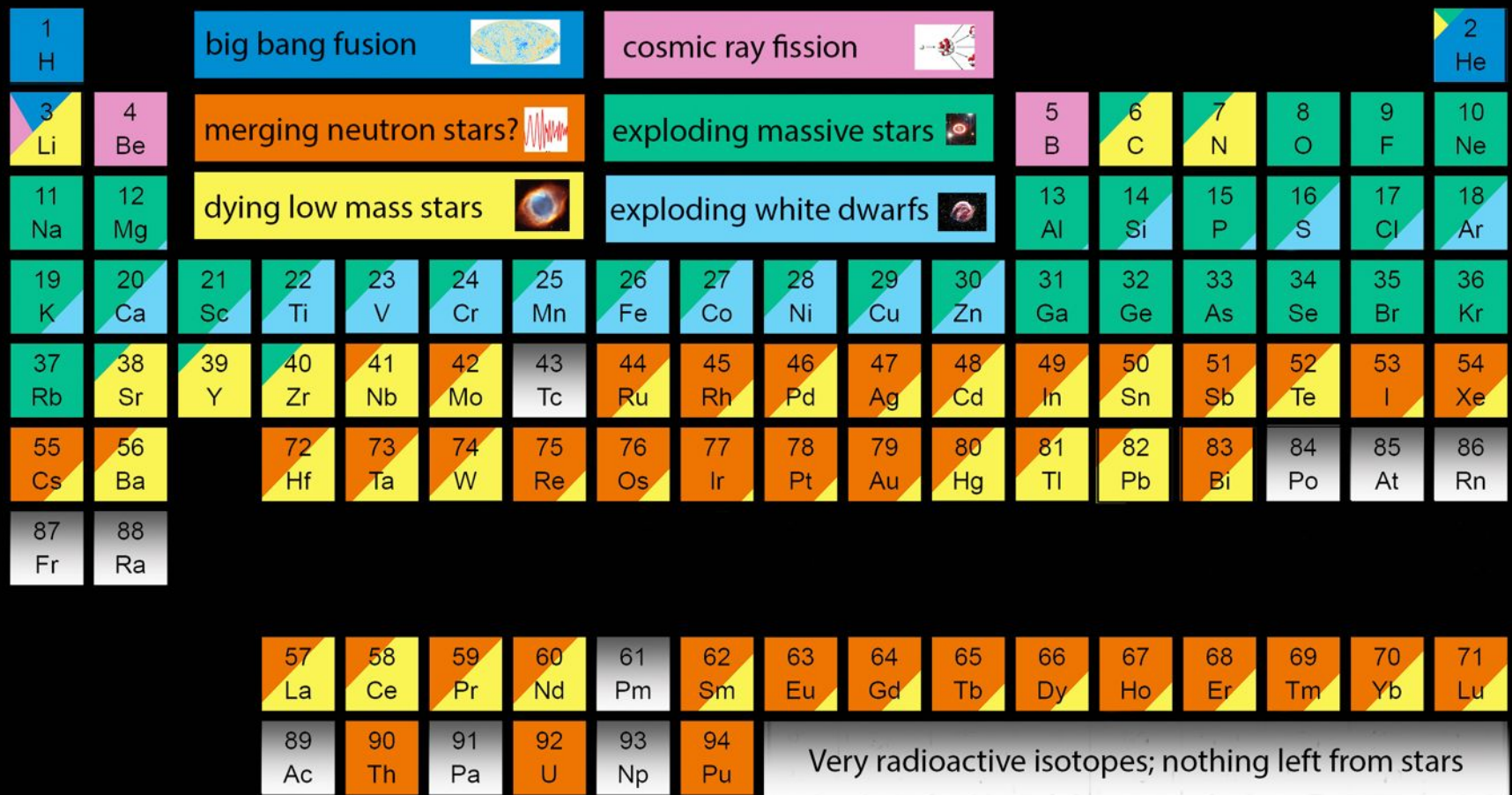
- To this?



Carbon, Oxygen, Nitrogen, Calcium, Iron...
All arranged in complex molecules



The Origin of elements



Graphic created by Jennifer Johnson
<http://www.astronomy.ohio-state.edu/~jaj/nucleo/>

Astronomical Image Credits:
 ESA/NASA/AASNova



**Section of the
JWST Advanced
Deep
Extragalactic
Survey (JADES)
Survey**

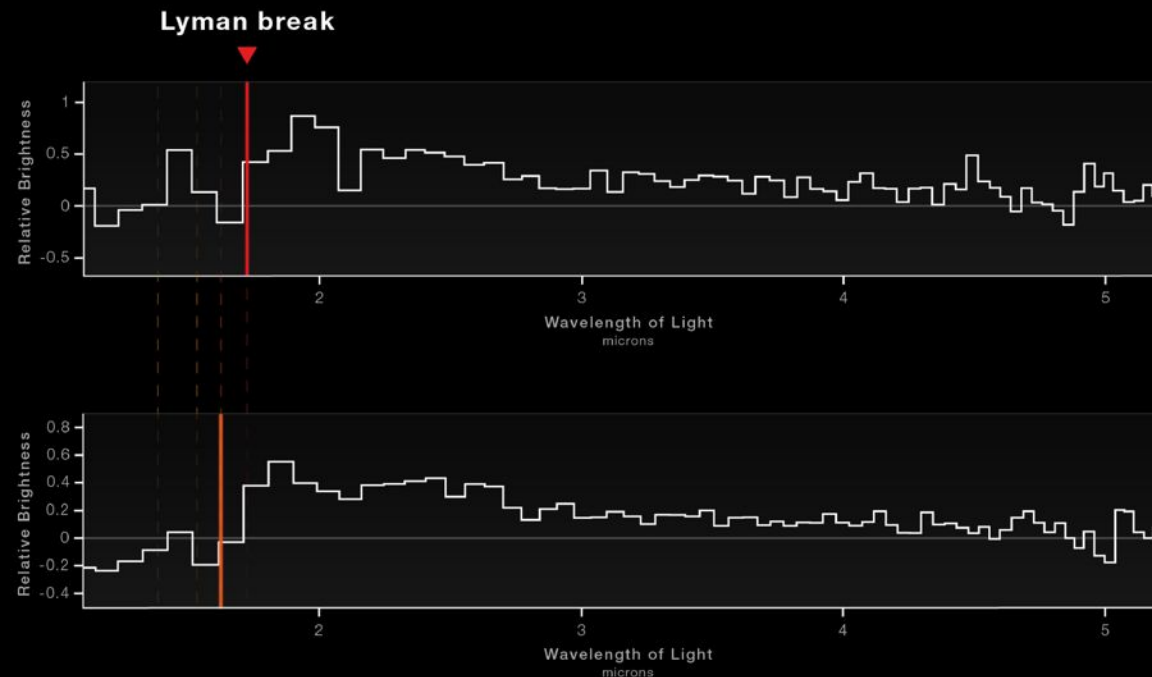
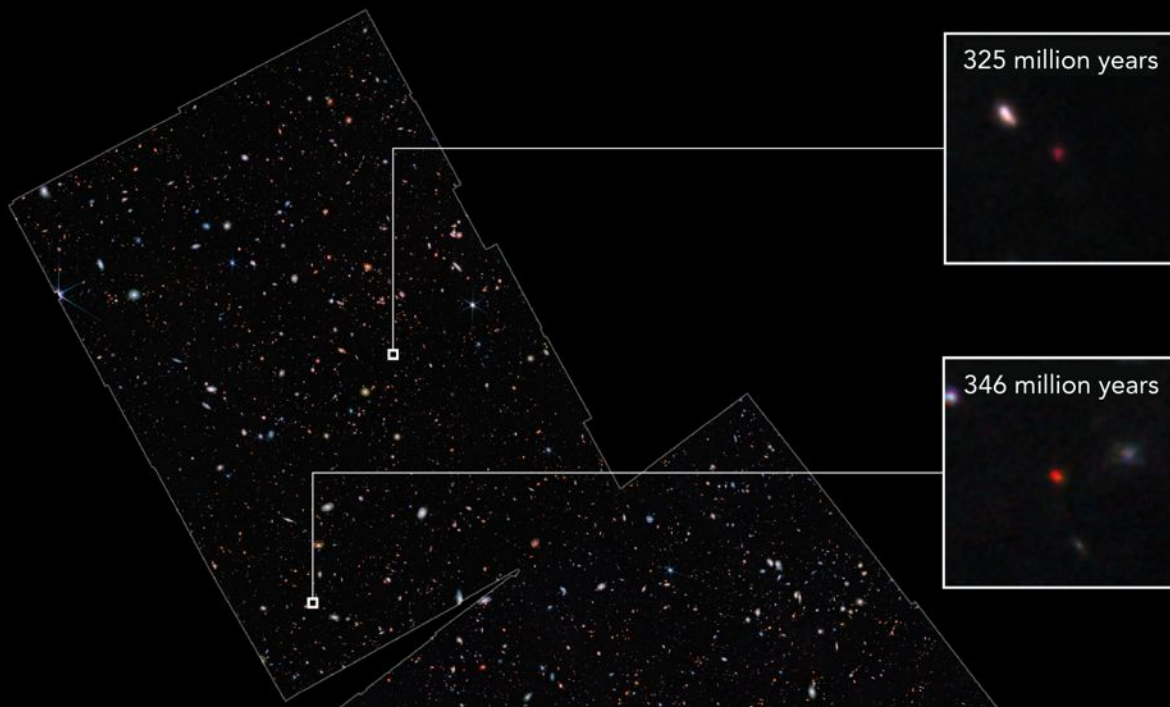
NIRCam imaging



Views of Galaxies in the Early Universe



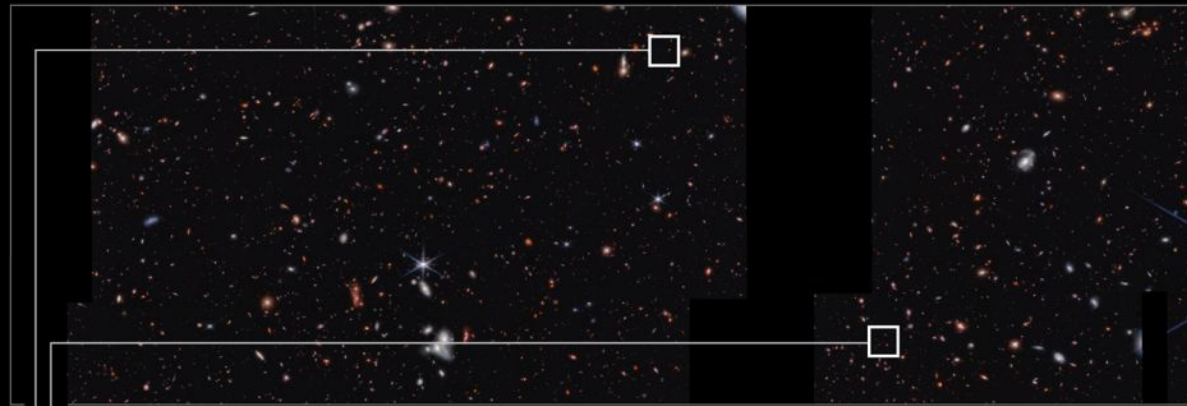
Identifying Even More Distant Galaxies



Tell Tale Signs

The shape of spectral lines can reveal black holes in the centers of galaxies

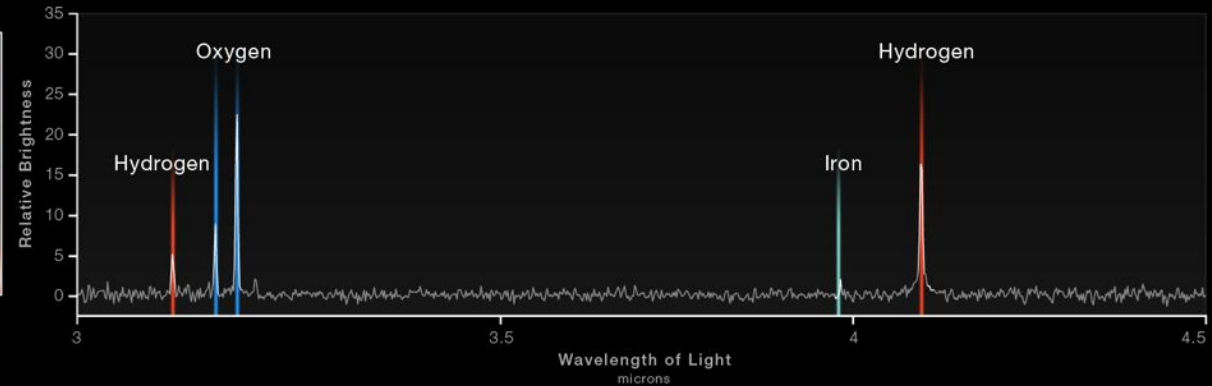
NIRCam Imaging



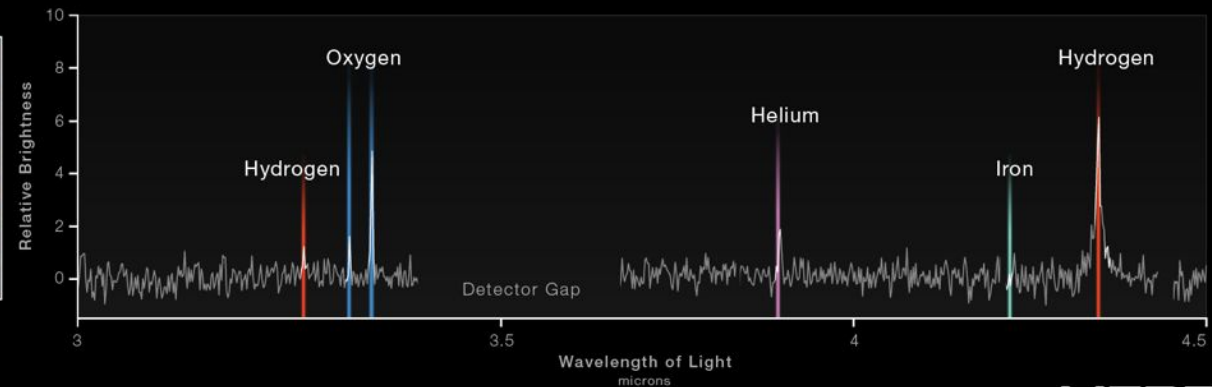
NIRSpec Microshutter Array Spectroscopy



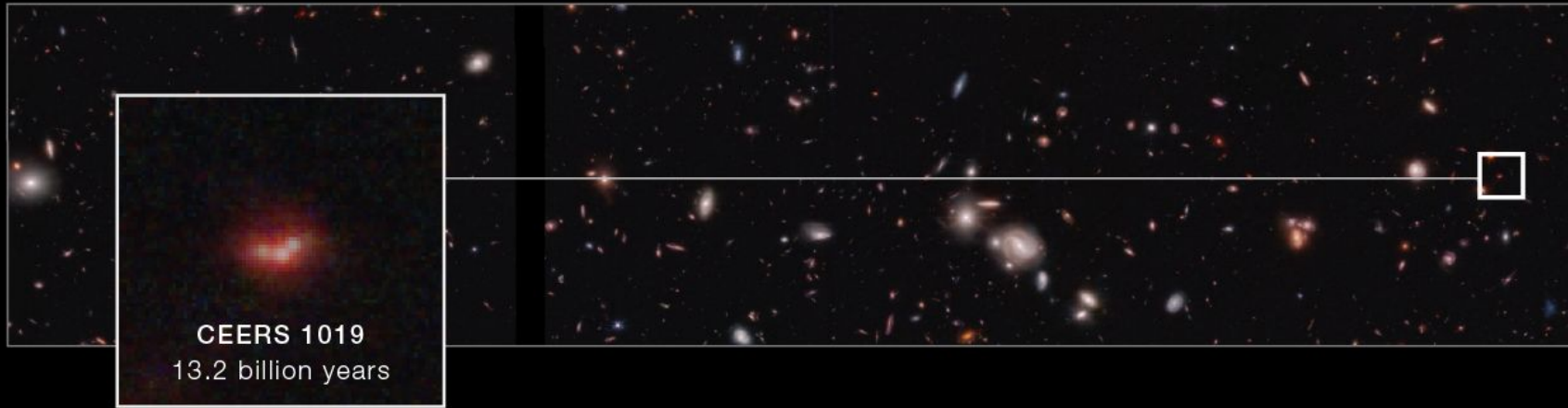
CEERS 2782
12.7 billion years



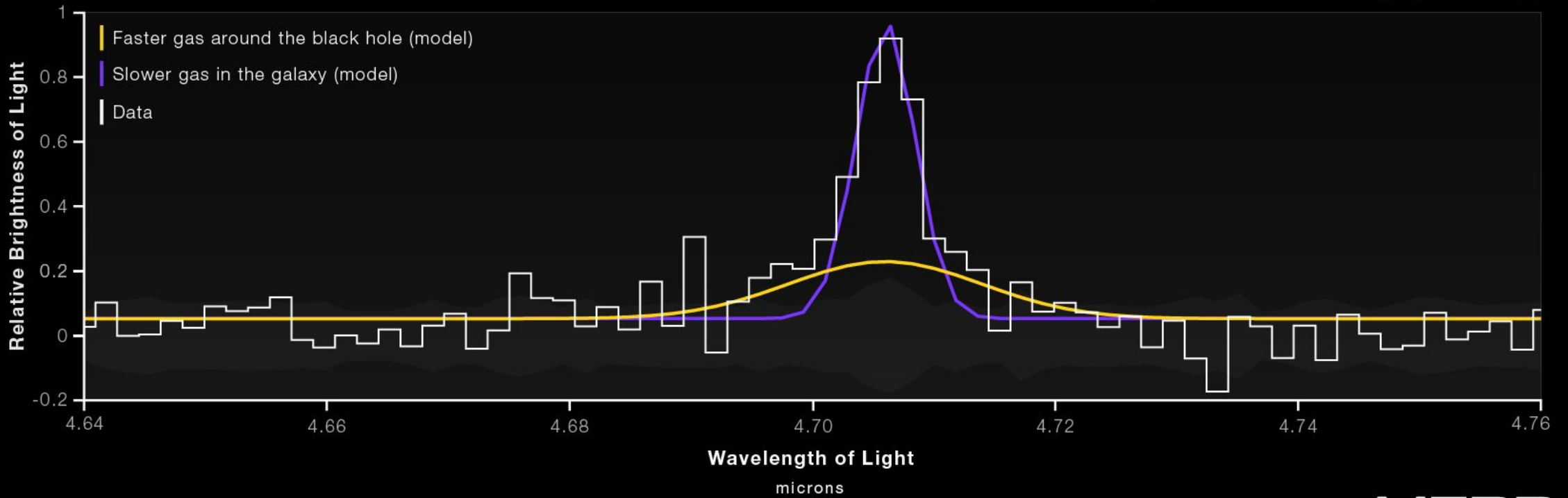
CEERS 746
12.8 billion years



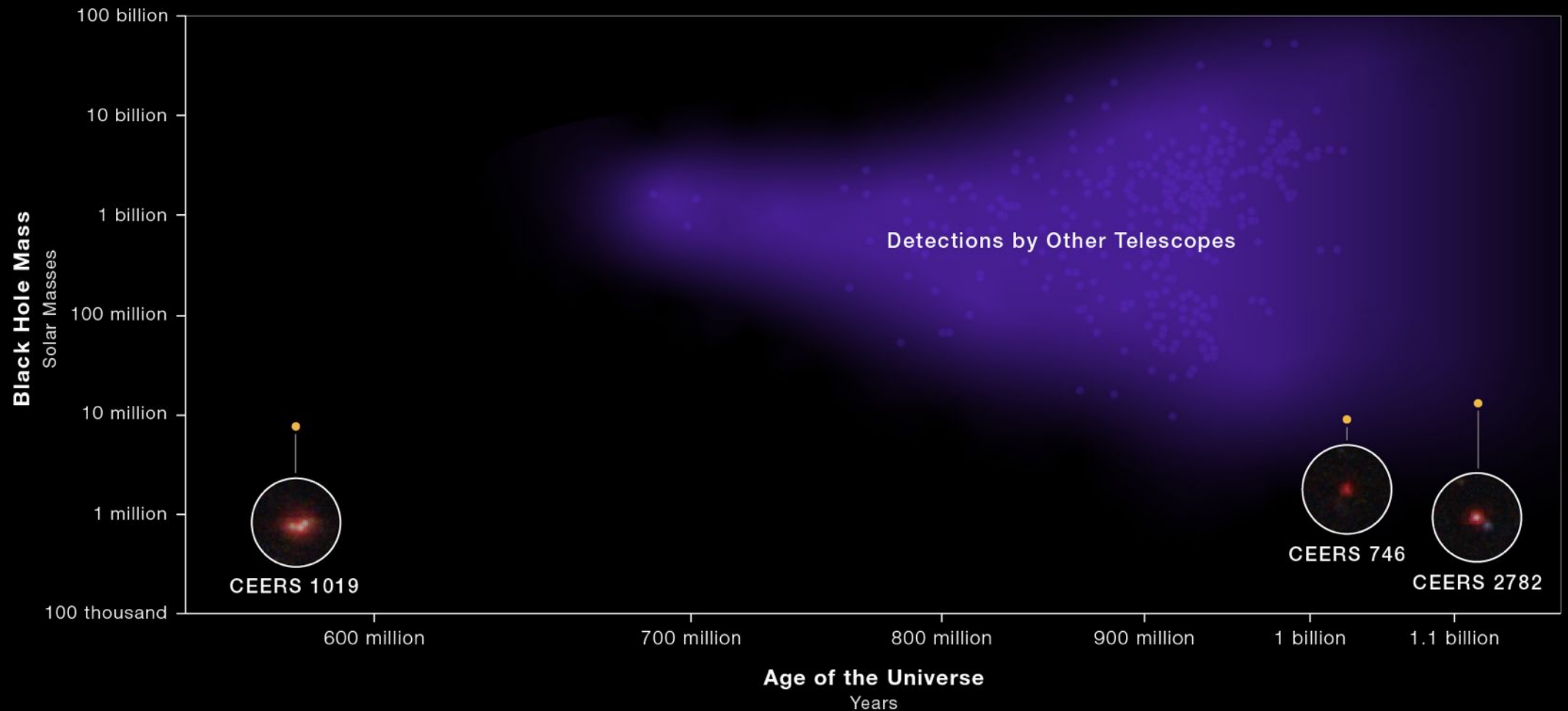
NIRCam Imaging



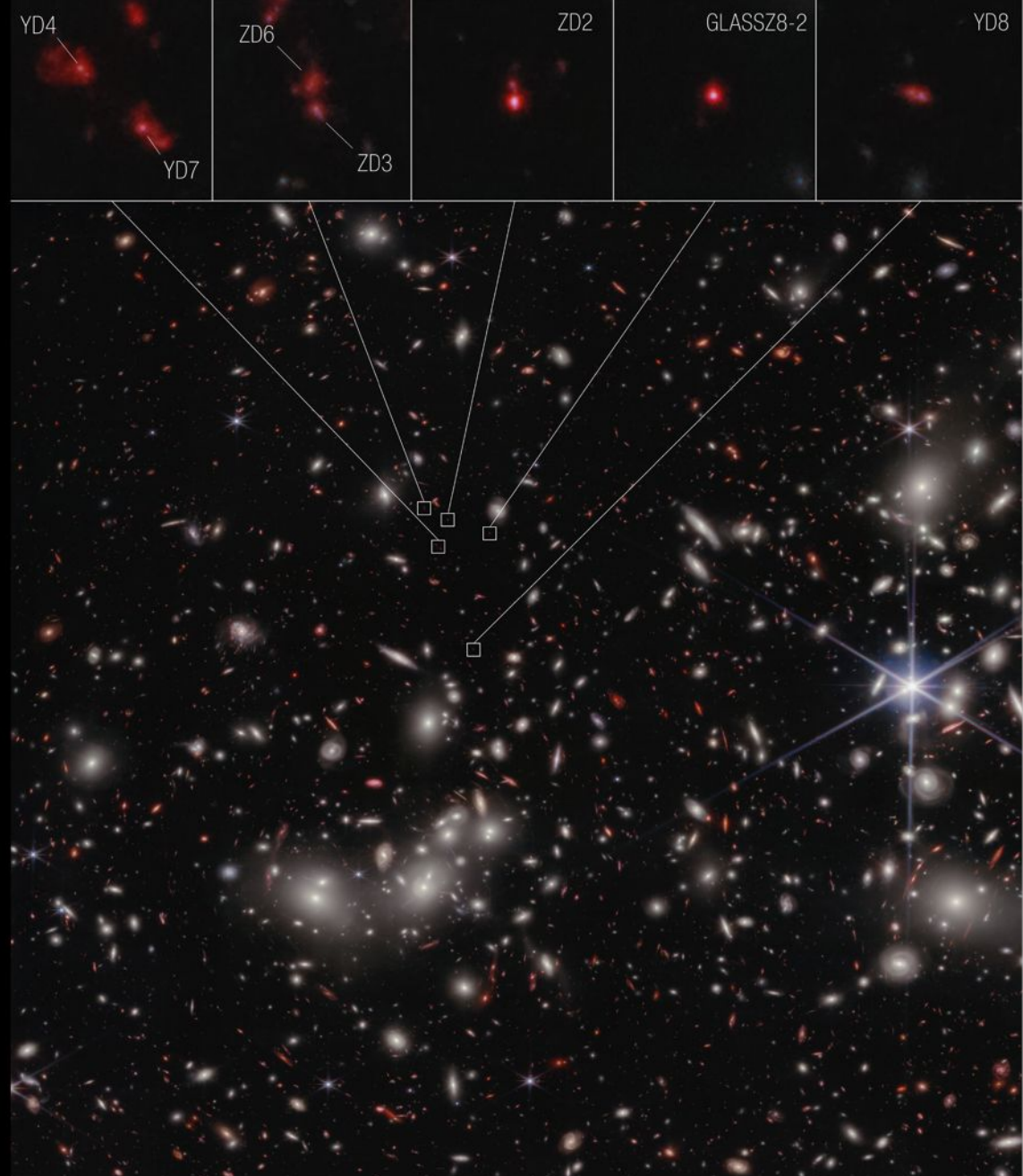
NIRSpec Microshutter Array Spectroscopy



Starting to see the rest of the iceberg



Extremely Distant Galaxies in Pandora's Cluster



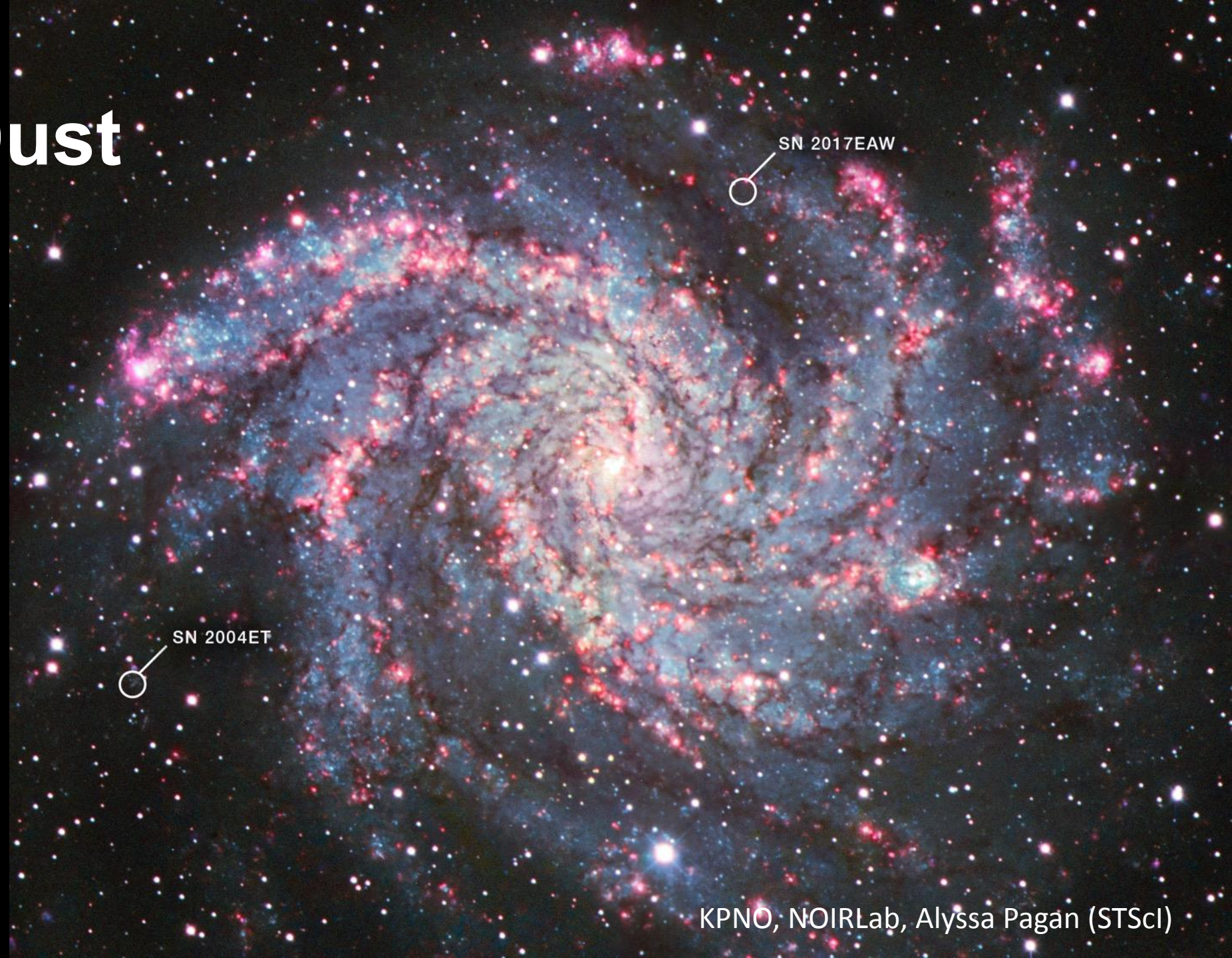


Webb Captures a Nearby Galaxy

Mid-Infrared Light NGC 1433

Dust to Dust

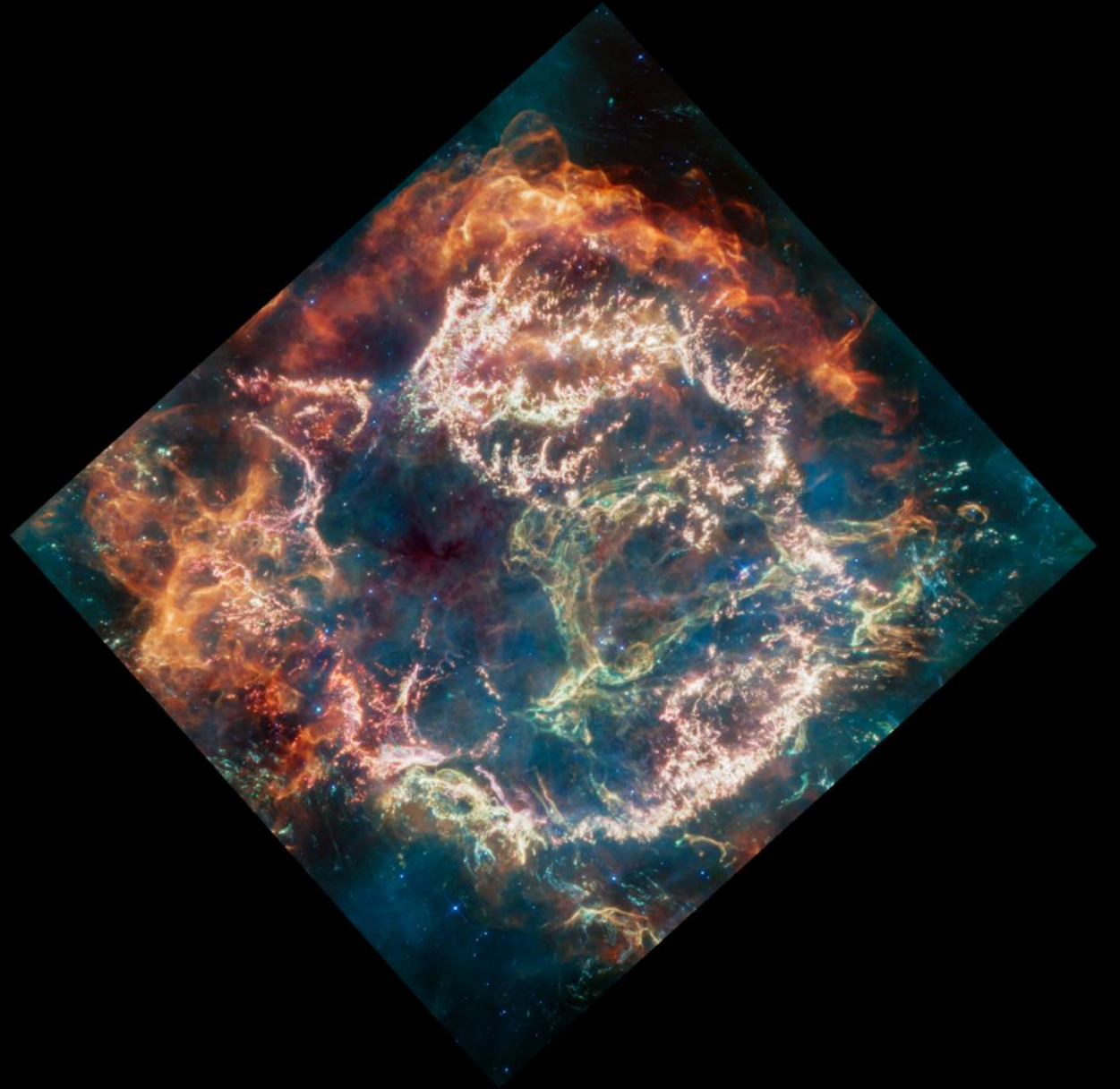
- 2 old supernovae
- Does the dust survive?



More dust survives than ever seen in a supernova besides SN 1987A (which is very close)



Never-Before-Seen Details in Supernova Remnant



Webb Discovers Ices in Dark Cloud

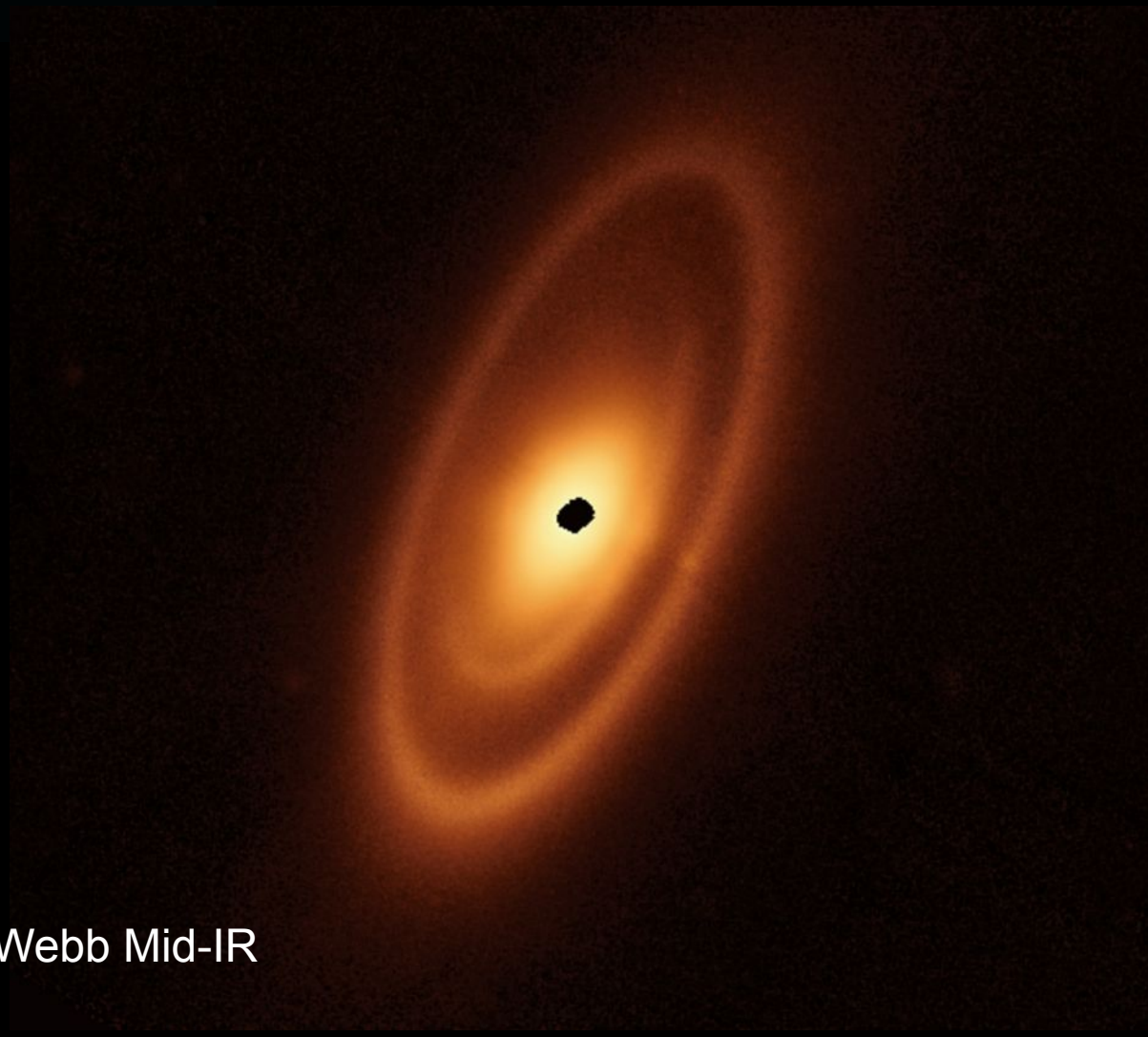




Exploring Objects in Our Galaxy



Dusty Disk in Nearby Fomalhaut



Webb Mid-IR



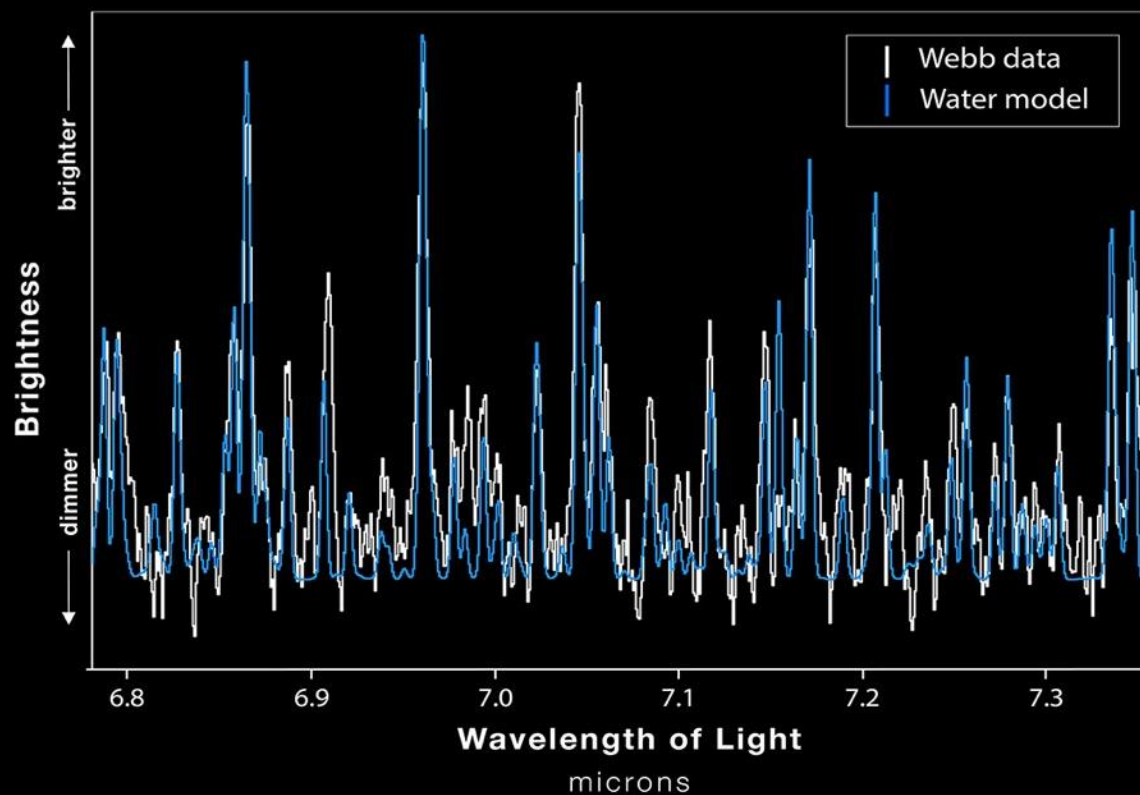
ALMA sub-mm radio

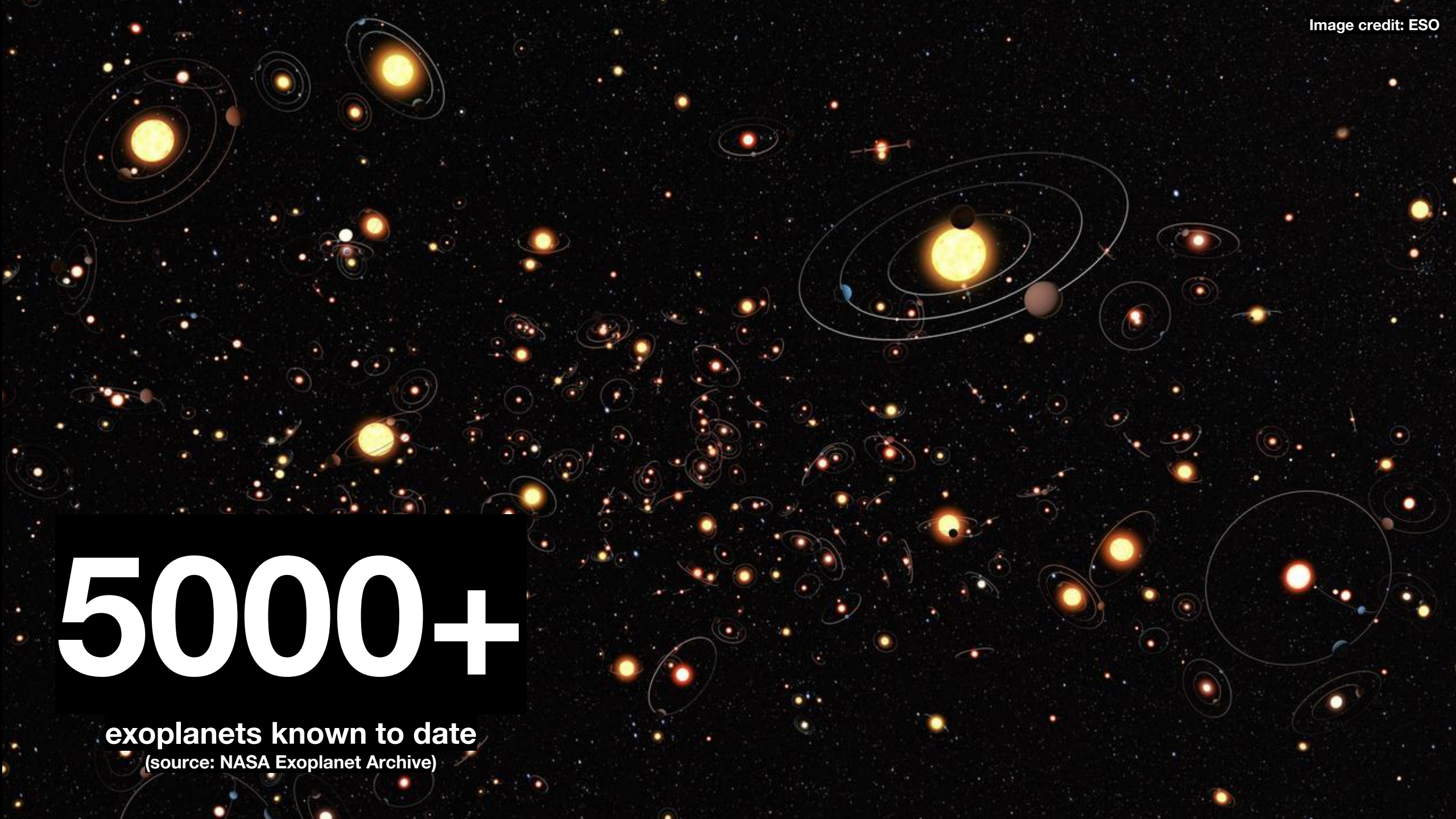


Water in the inner disk of PDS 70

PDS 70 INNER DISK EMISSION SPECTRUM

MIRI | IFU Medium-Resolution Spectroscopy

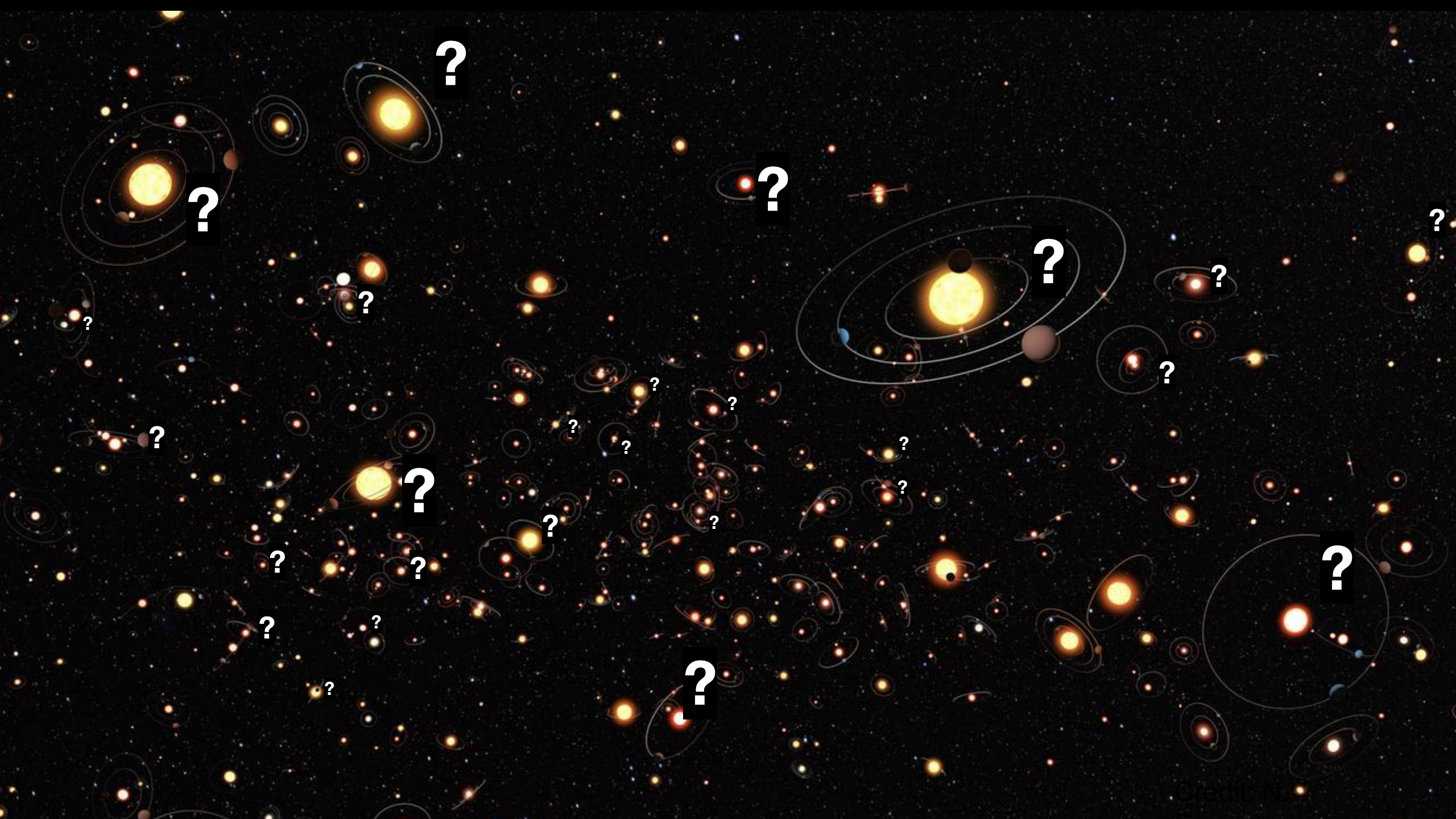


The background of the image is a dark, star-filled space. Numerous stars of various colors (yellow, orange, red, blue) are scattered across the field. Many of these stars have thin, white elliptical lines drawn around them, representing the orbits of planets. Some of these orbits have small, colored spheres (representing planets) placed at various points along the path. The overall effect is a dense field of celestial bodies, illustrating the discovery of exoplanets.

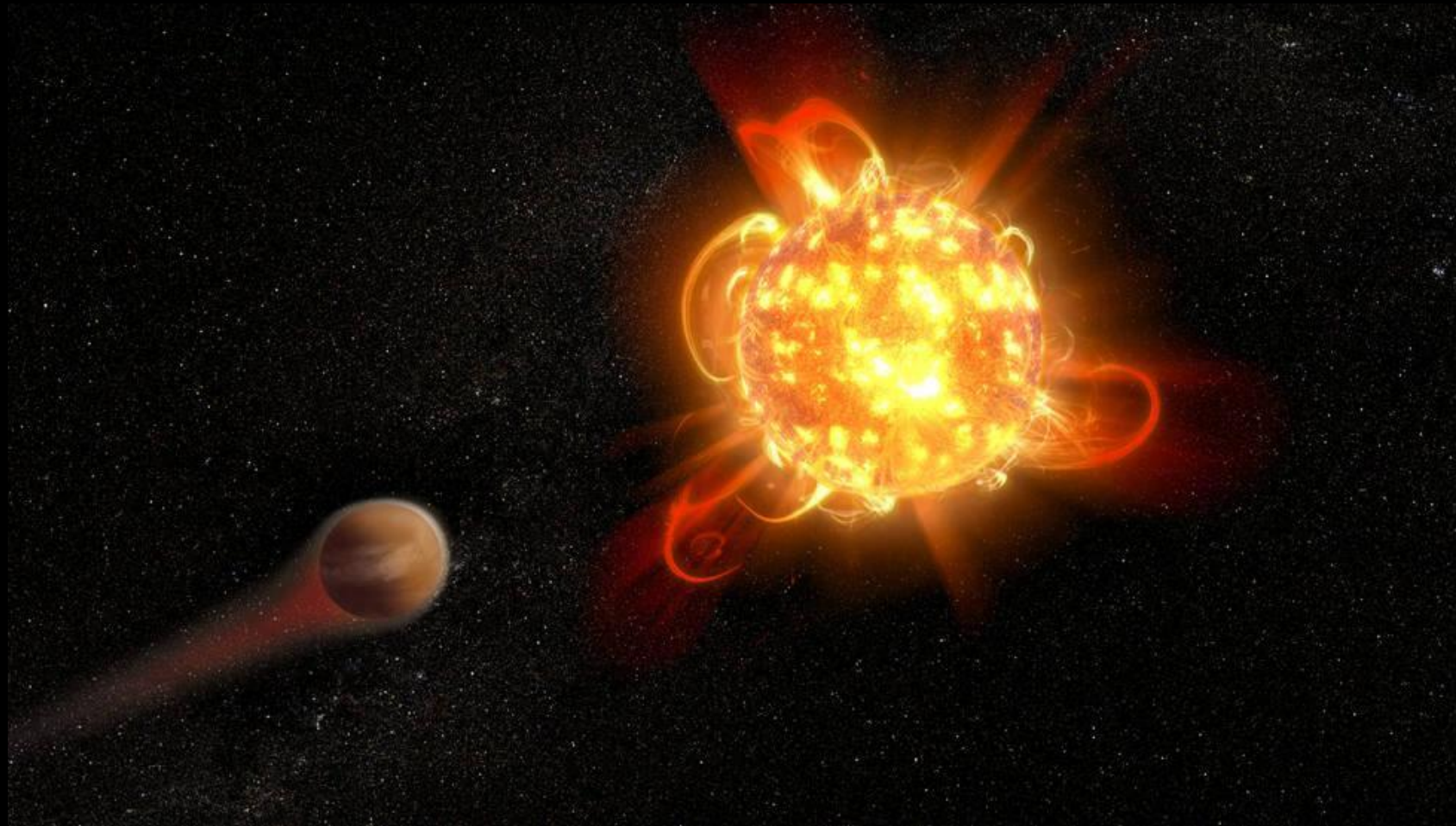
5000+

exoplanets known to date

(source: NASA Exoplanet Archive)



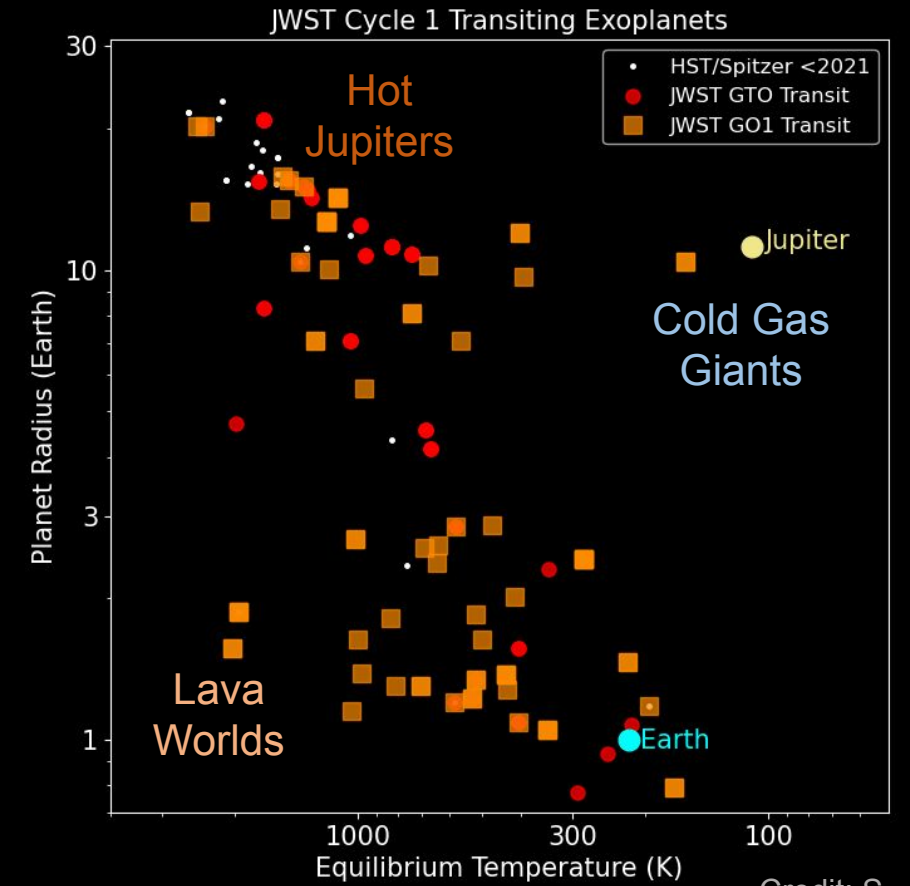
Challenges for Habitability



- Most planets are around Red Dwarf stars
- Habitable zone is close to the star
- Violent flares
- Star is hotter for longer early in life
- Can they have an atmosphere at all?

Formation of Strange Worlds

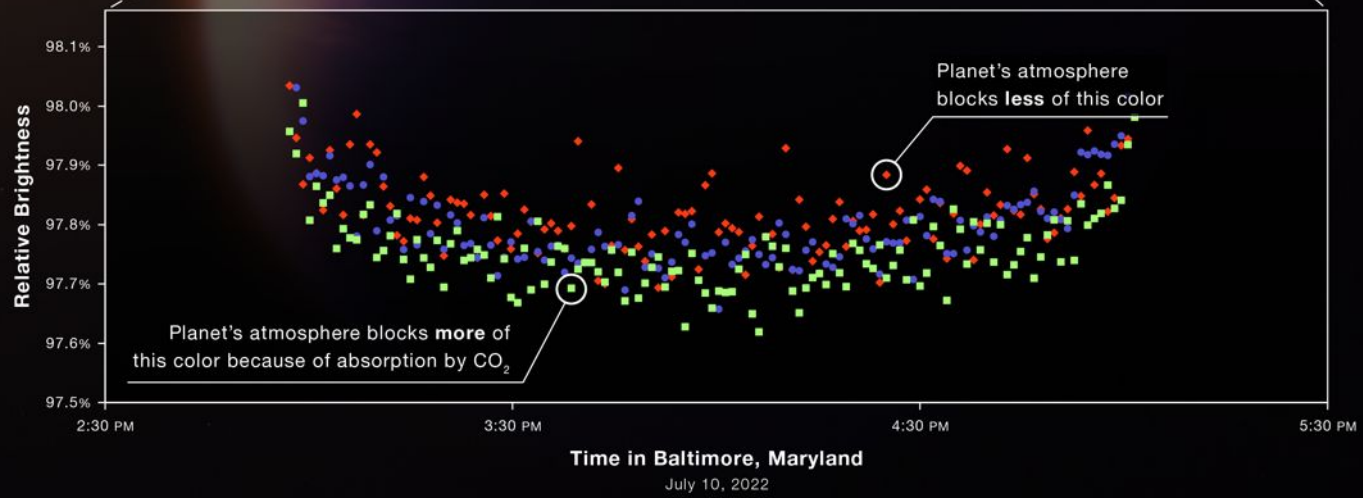
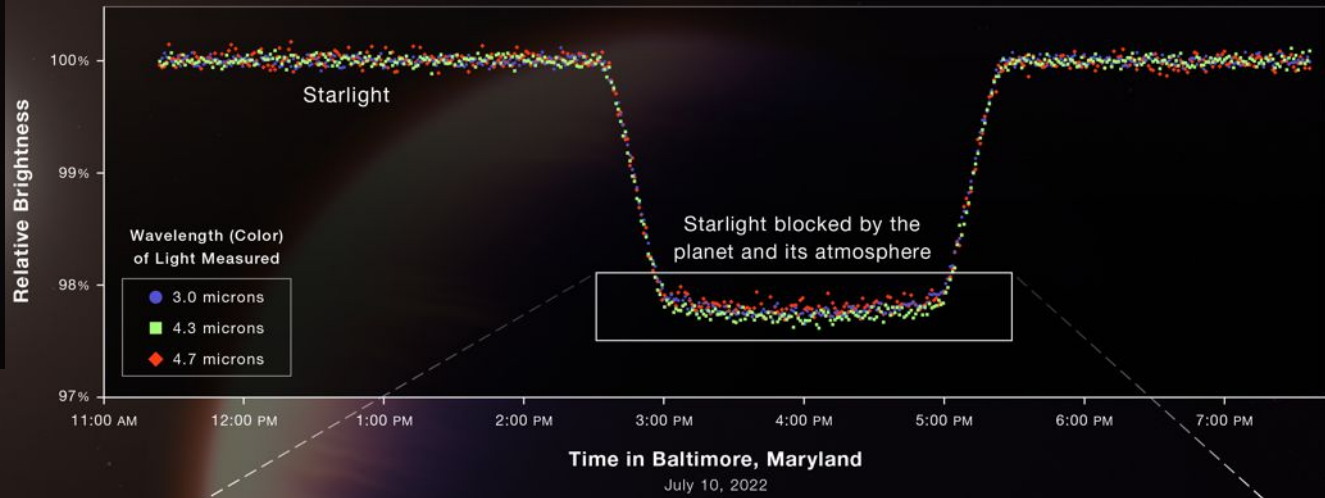
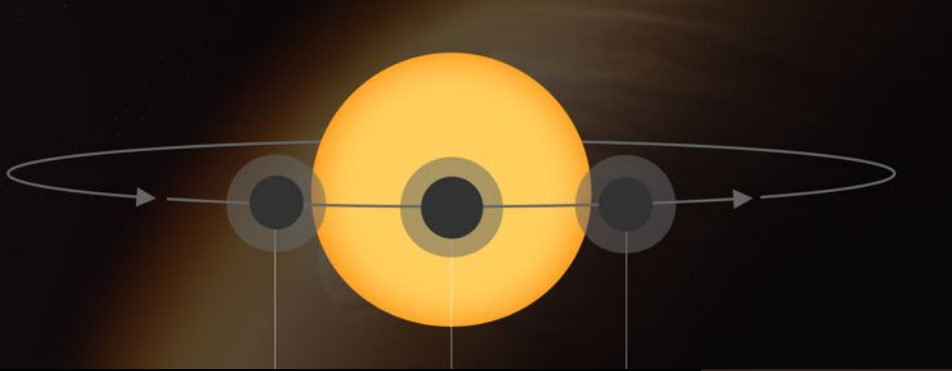
- Hot Jupiters
- Sub-Neptunes
- Super-Earths



Credit: S. Mullally/STScI

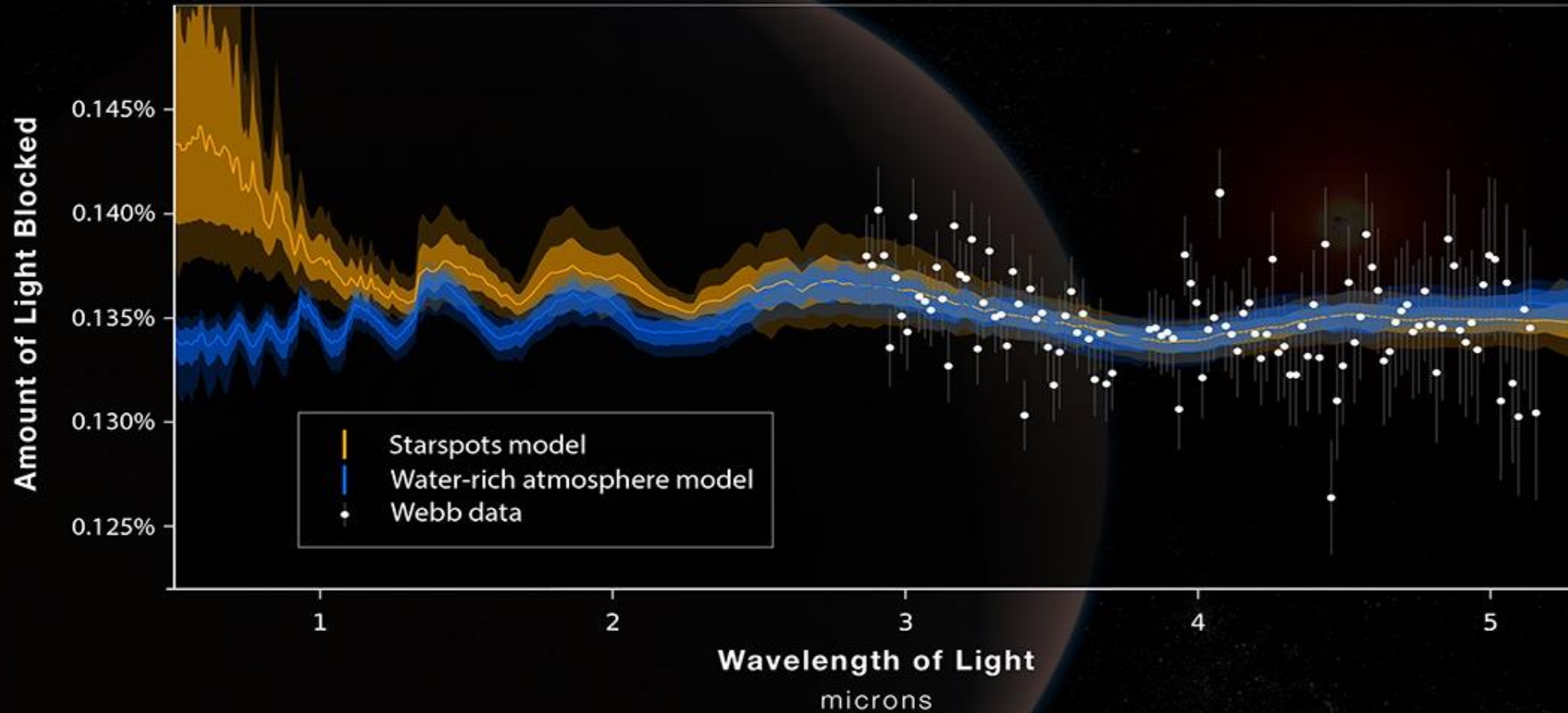


Transit Spectroscopy

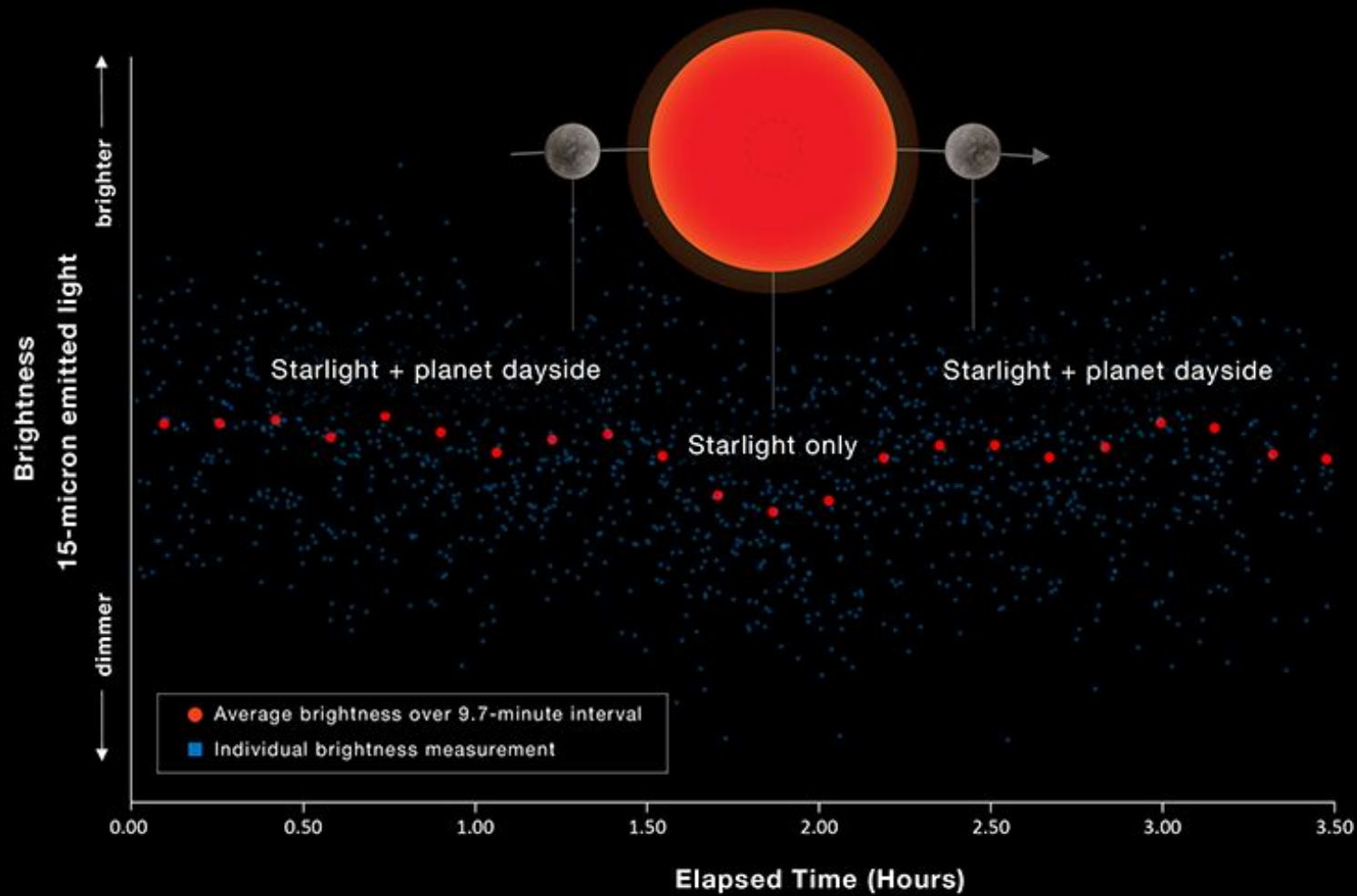




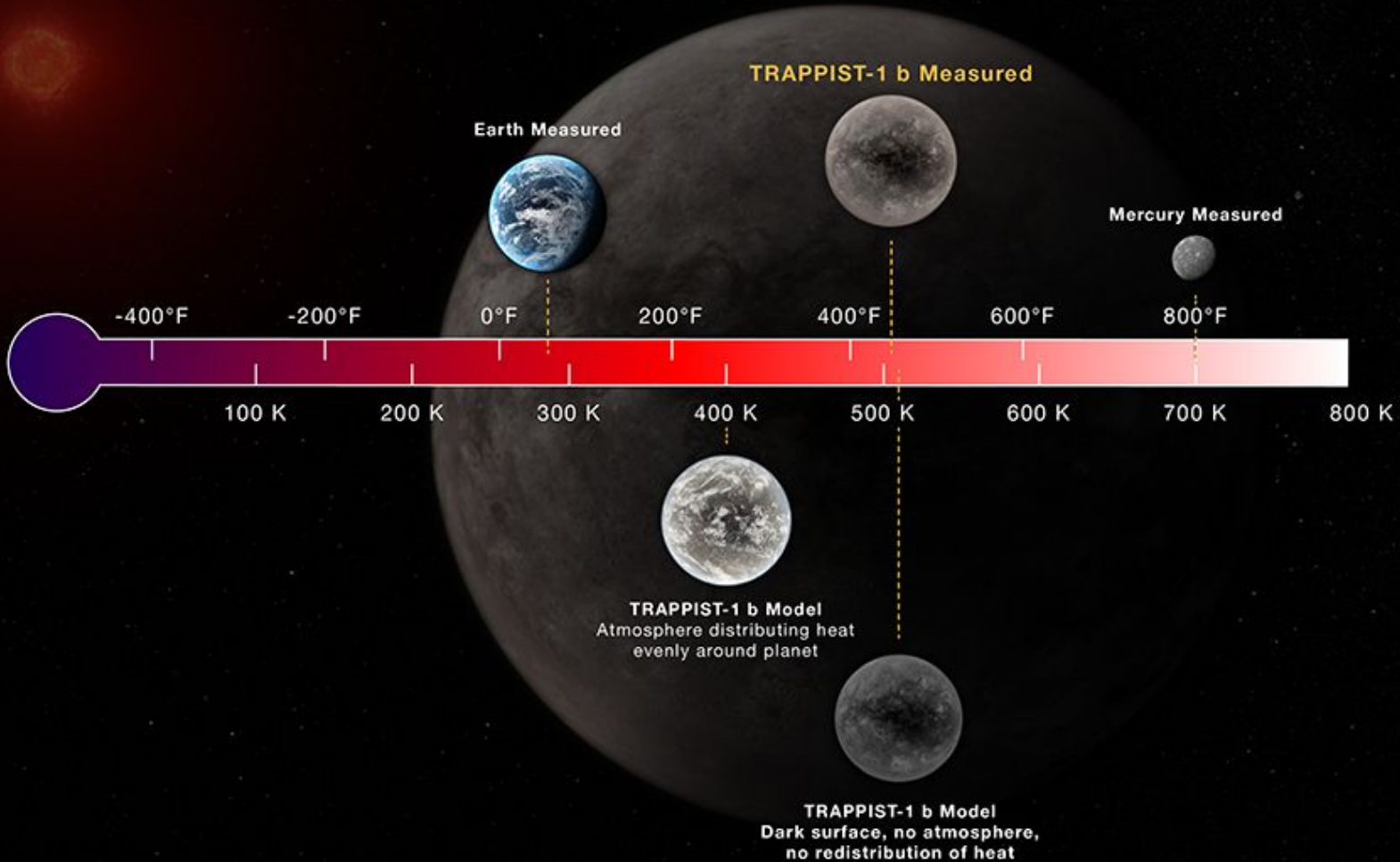
Water somewhere – on the star or the planet? GJ 486b



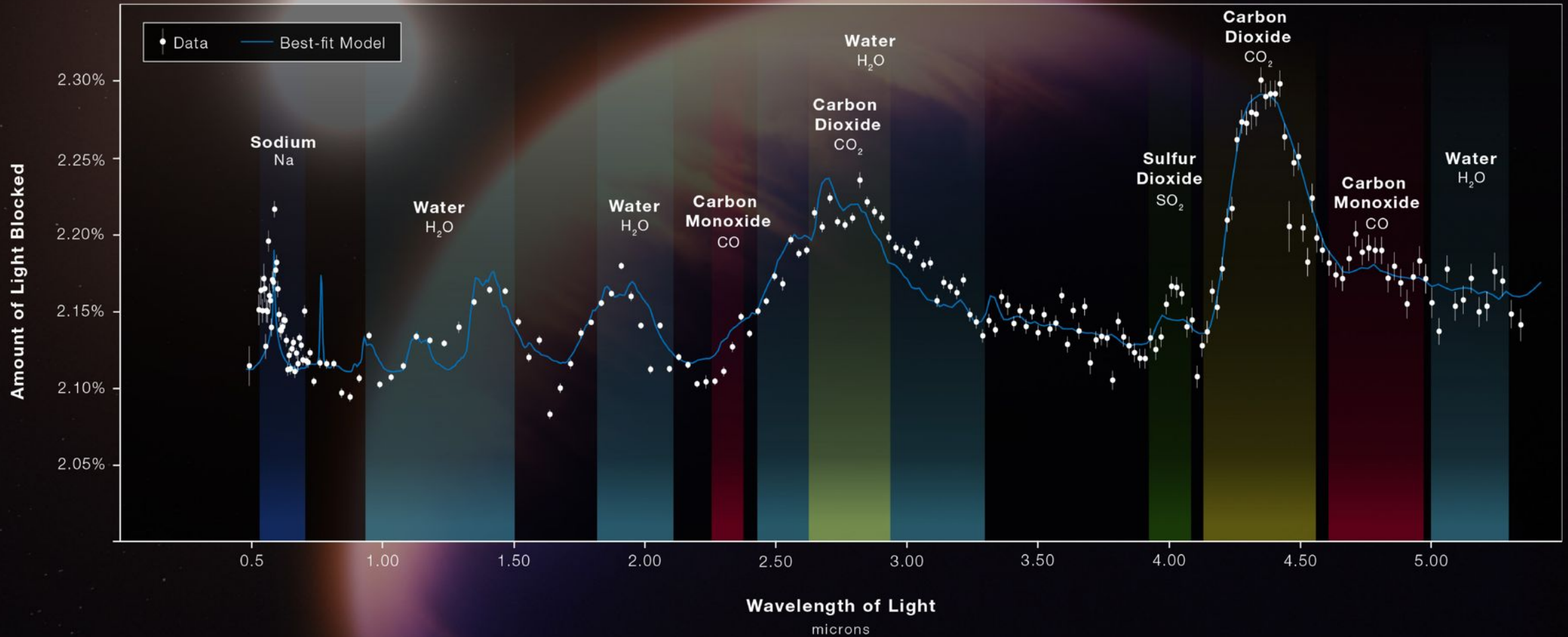
Secondary Eclipses



Trappist-1 b

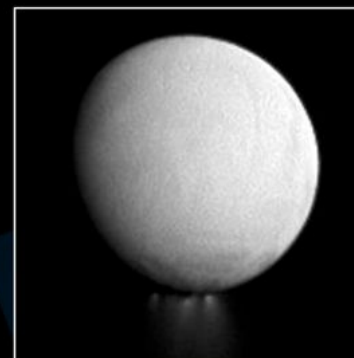
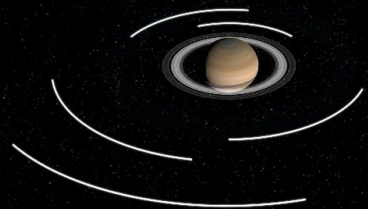


Analyzing a Gas Giant's Atmosphere

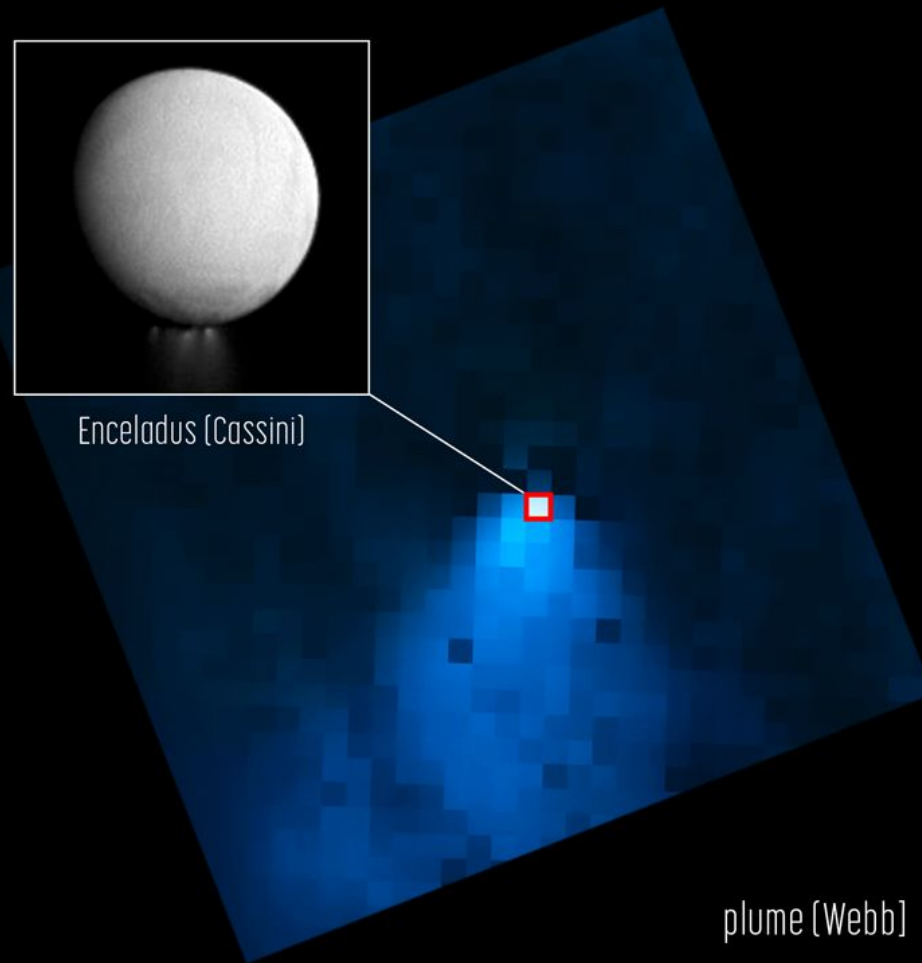




The Geysers of Enceladus



Enceladus (Cassini)



plume (Webb)

Webb's Ongoing Discoveries





Resources

Webb Mission

Explore the latest resources, image releases, videos, and up to date news from the Webb mission at it's science communication website for the public.



<https://webbtelescope.org>

Zoomable Images

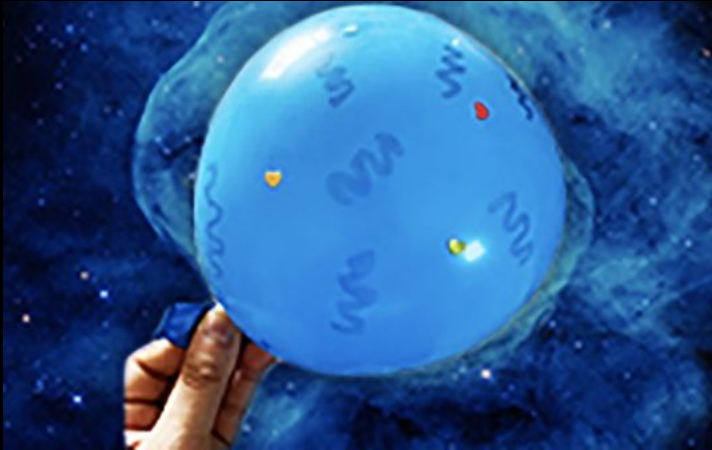
Get into the details and explore Webb images as close up as you want to get!



Videos



Hands-on Activities



NASA'S UNIVERSE OF LEARNING

Exoplanet Trading Cards

How to play

- One person reads the "Did You Know?" and "Types of Exoplanets" cards to the group.
- Each person gets a game card.
- Group members review the information on their cards.
- The game begins when one player reads aloud the information on their card and asks their game question.
- The player holding the card with the answer to that question responds, shares the information on their card, and reads aloud their own game question.
- The game continues until all cards have been shared aloud with the group.



Earth diameter

Kepler-1229 b

Kepler-1229 b

A super Earth discovered in 2016. It is the only known planet in its system at this time.

Approx. star temperature: 3,450 °C

Distance from star: 0.3 AU

Orbital period: 86.8 Earth days

Habitable zone: Yes

Game Question

What gas giant was discovered in 2008?

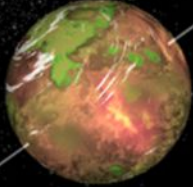
Answer: Beta Pictoris b



Digital Activities

About the Planet

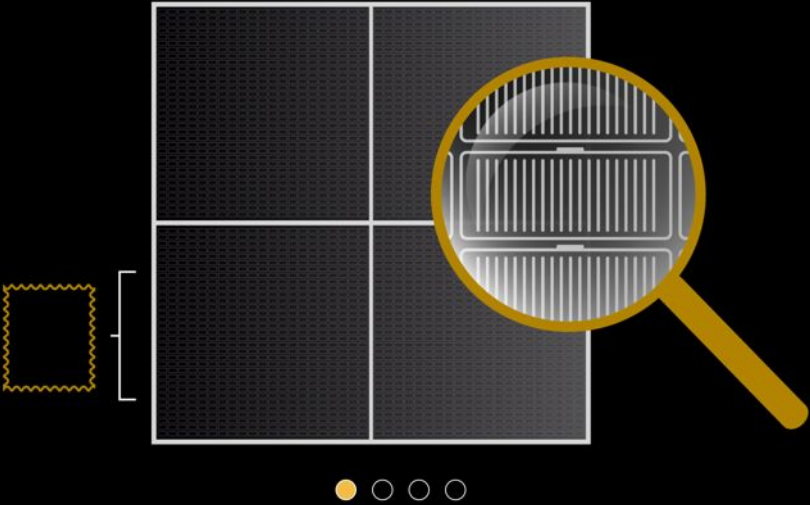
ROCKY PLANET



Name: Kepler-11 c
Planet type: Super Earth
Discovery date: 2010
Mass: 2.9 x Earth
Planet radius: 0.256 Jupiters

Orbital radius: 0.11 AU
Orbital period: 13 days
Eccentricity: 0.026
Method of Detection: Transit

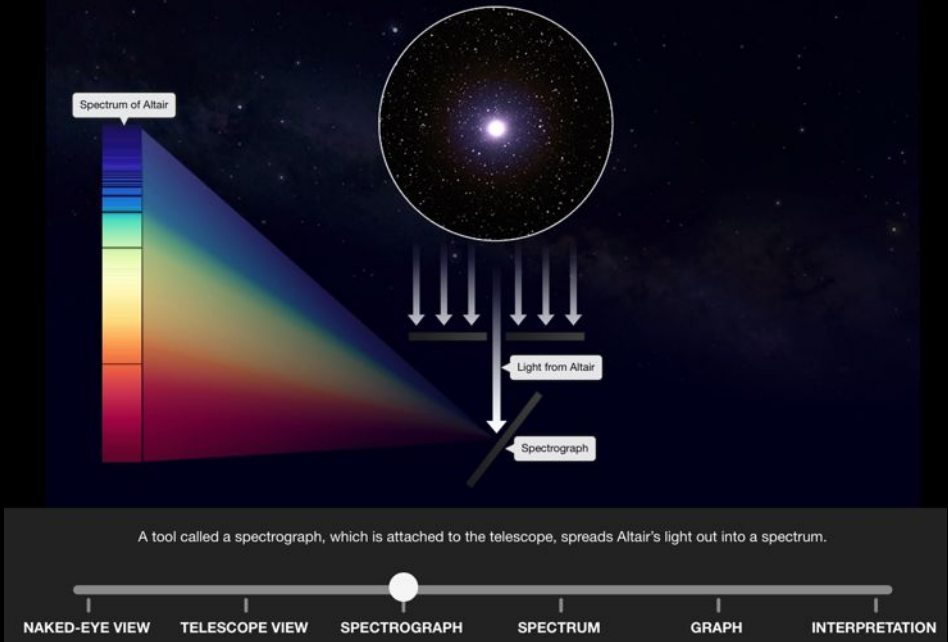
PLANET VIEW	PLANETARY SYSTEM VIEW
HOW LONG TO TRAVEL HERE?	COMPARE WITH OUR SOLAR SYSTEM
HABITABLE ZONE	COMPARE SIZE



NASA's ASTROPHOTO CHALLENGE



NASA'S UNIVERSE OF LEARNING



Spectrum of Altair

Light from Altair


Spectrograph

A tool called a spectrograph, which is attached to the telescope, spreads Altair's light out into a spectrum.

NAKED-EYE VIEW TELESCOPE VIEW SPECTROGRAPH SPECTRUM GRAPH INTERPRETATION

Webb Outreach Presentation


**WEBB'S
FIRST YEAR OF
SCIENCE**



Pillars of Creation (Near- and Mid-Infrared Composite Image)

Slide 7 of 41

New Views of Our Solar System



It's only been one year since the James Webb Space Telescope's first full-color images and data were released!

What has Webb shown us? Let's take a tour together!

Resources:

Article, "The Plan for Webb's First Year of Science":
<https://webbtelescope.org/contents/articles/webbs-first-year-of-science>

Webb's first images were released July 12, 2022:
<https://webbtelescope.org/contents/news-releases/2022/news-2022-028>

Complete roundup of Webb's first full-color images and data news releases: <https://webbtelescope.org/news/news-releases?Collection=First%20Images>

Pillars of Creation (Near- and Mid-Infrared Composite Image):
<https://webbtelescope.org/contents/media/images/01GK2KKT81SGYF24YBGYG7TAP>

A A

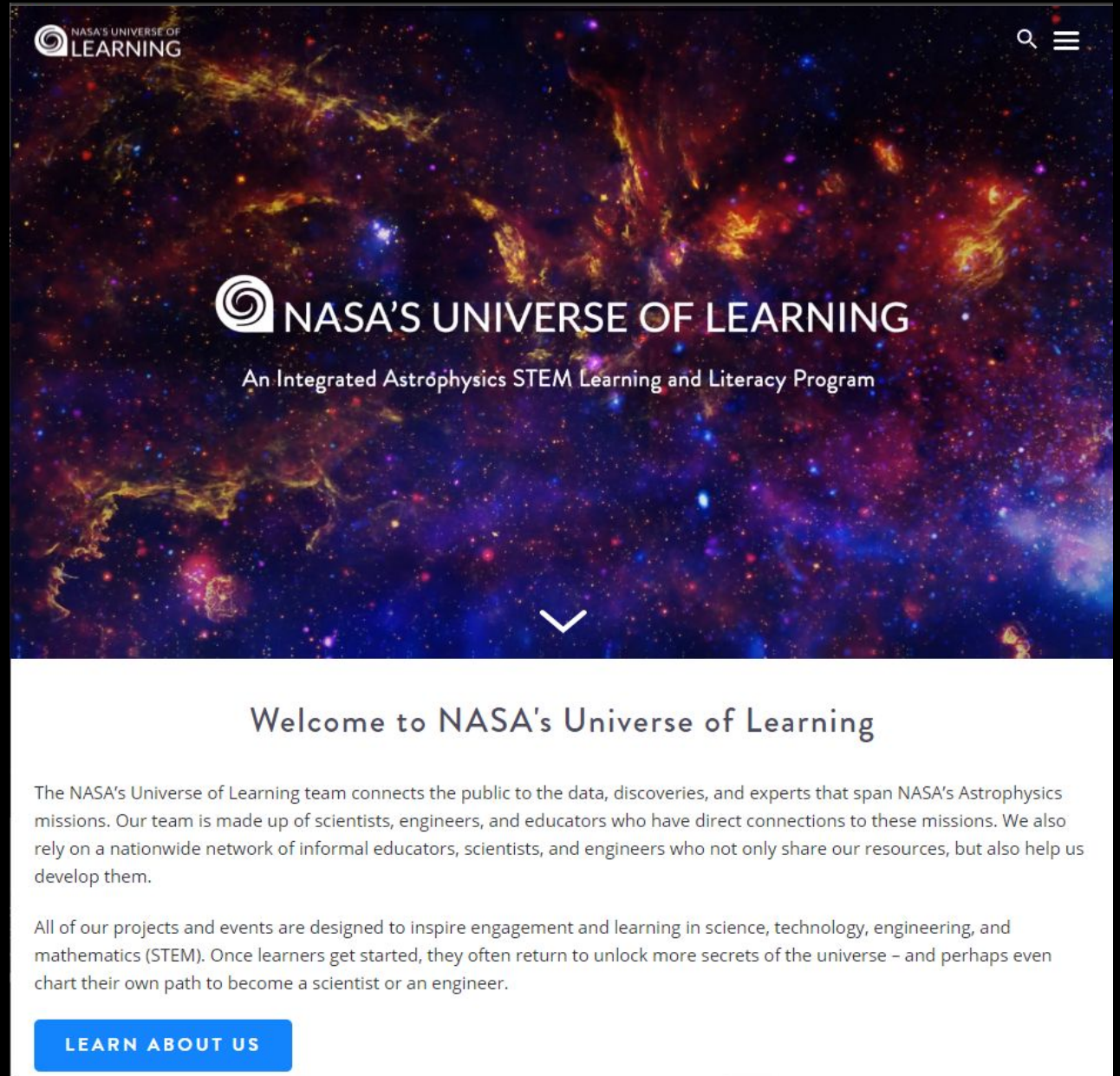
**WEBB'S
FIRST YEAR OF
SCIENCE**



NASA's Universe of Learning

- ViewSpace
- NASA's AstroPhoto Challenges
- Science Briefings, in partnership with:
 - Museum and Informal Education Alliance
 - Solar System Ambassadors



NASA'S UNIVERSE OF LEARNING

NASA'S UNIVERSE OF LEARNING

An Integrated Astrophysics STEM Learning and Literacy Program

Welcome to NASA's Universe of Learning

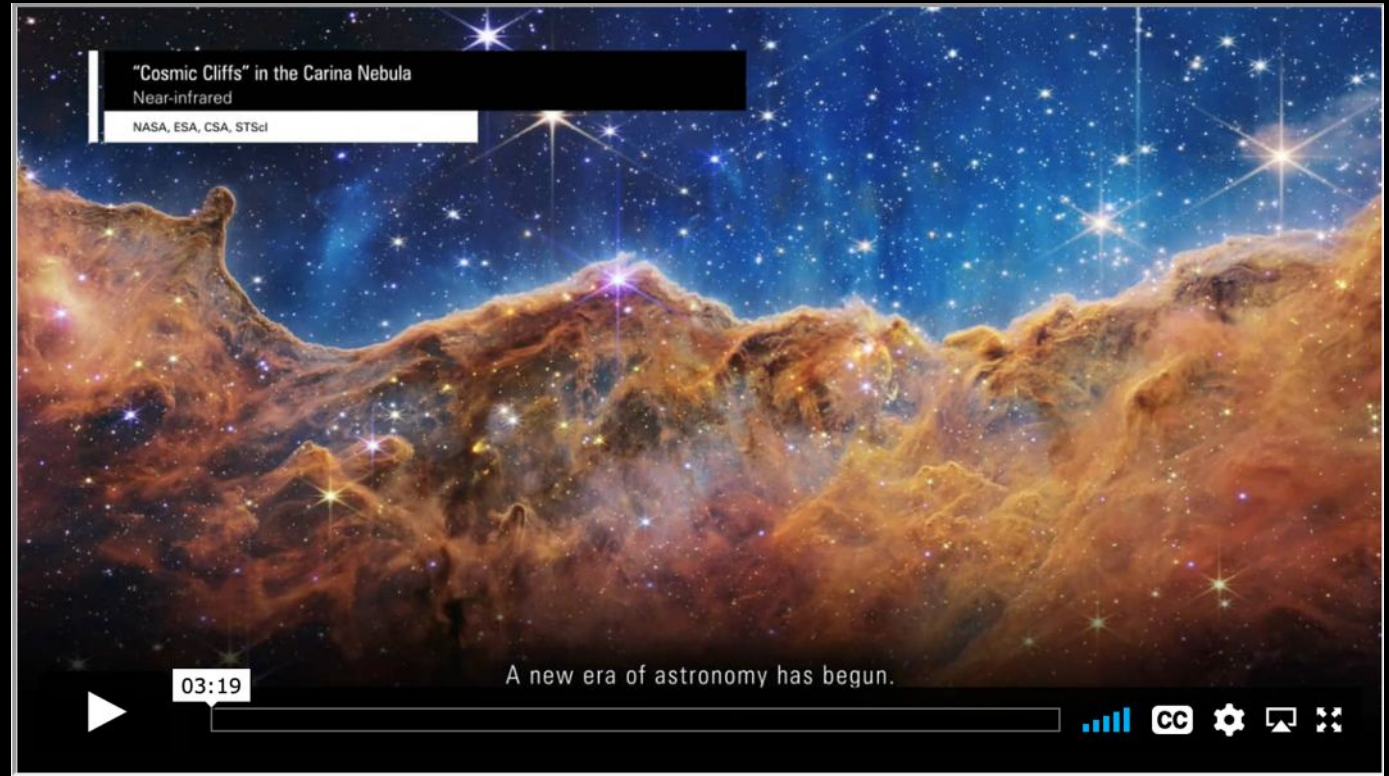
The NASA's Universe of Learning team connects the public to the data, discoveries, and experts that span NASA's Astrophysics missions. Our team is made up of scientists, engineers, and educators who have direct connections to these missions. We also rely on a nationwide network of informal educators, scientists, and engineers who not only share our resources, but also help us develop them.

All of our projects and events are designed to inspire engagement and learning in science, technology, engineering, and mathematics (STEM). Once learners get started, they often return to unlock more secrets of the universe – and perhaps even chart their own path to become a scientist or an engineer.

LEARN ABOUT US

ViewSpace

ViewSpace is a free, web-based collection of dozens of digital interactives and hundreds of videos highlighting the latest developments in astronomy.



NASA'S ASTROPHOTO CHALLENGES

Try your hand at processing images from NASA's space telescopes, or capture and process your own!

NASA Data Challenge

Choose from past seasons of the NASA Data Challenge below.

See [standout entries](#) for the MicroObservatory Challenge

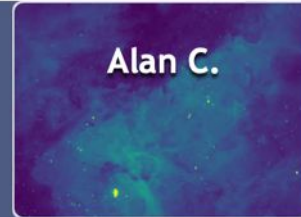
Summer 2022
Eta Carinae and the Carina Nebula

Summer 2021
M87 Galaxy

Winter 2020
M82 Galaxy



Adam J.



Alan C.



Allison R.



Anika J.



Aniya J.



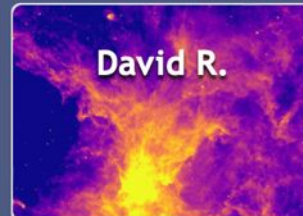
Ann J.



Christina D.



Danielle H.



David R.



Disha K.



Elizabeth P.



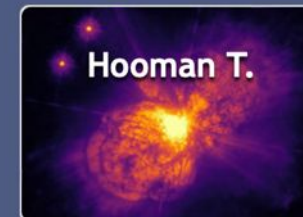
Ellen K.



Erick S.A.



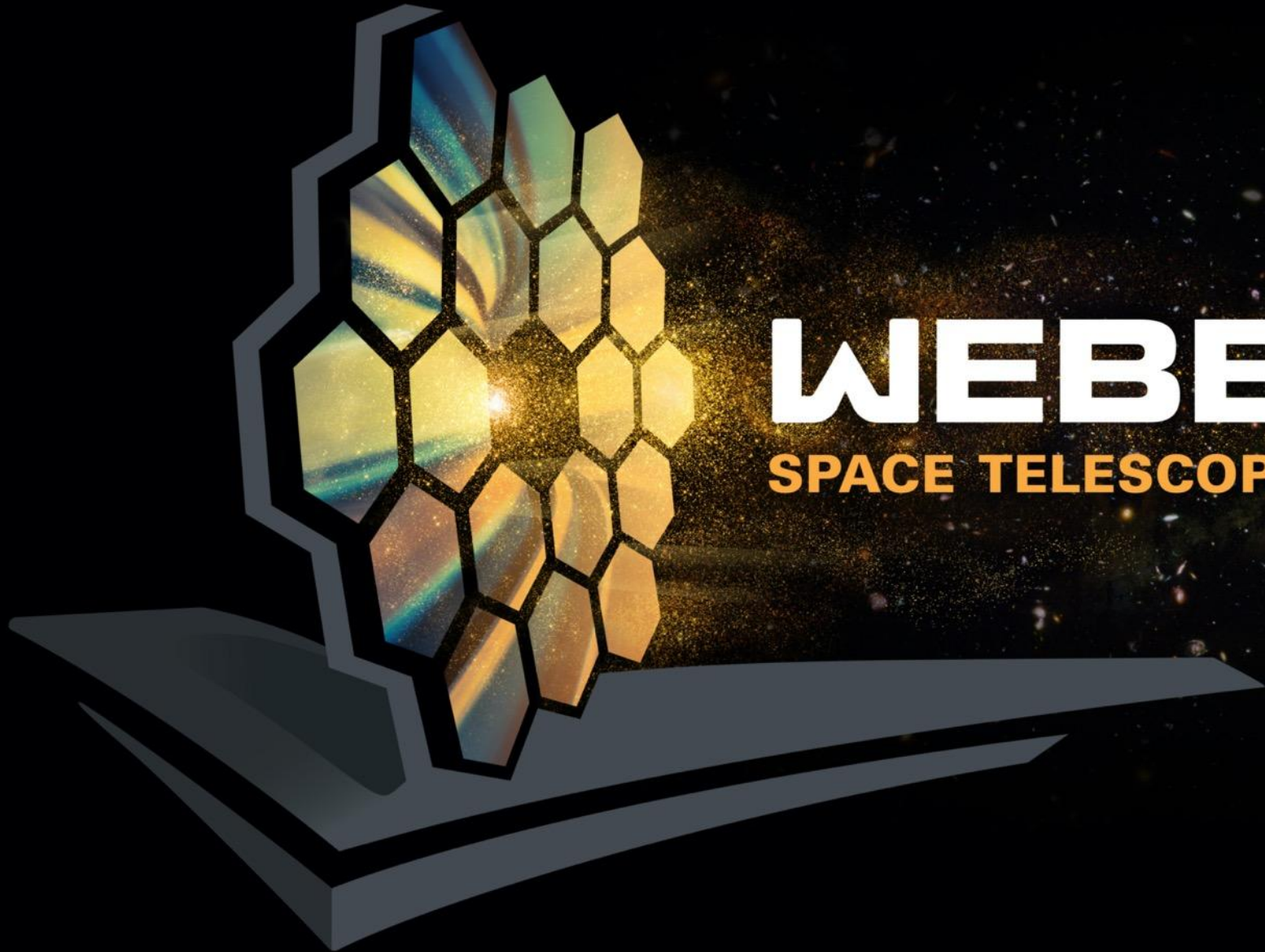
Fabiana M.



Hooman T.



Jacy F.



WEBB
SPACE TELESCOPE

Questions?

Resources & Opportunities



Learn more and access the NISE Network's online digital resources:
nisenet.org/browse-topic

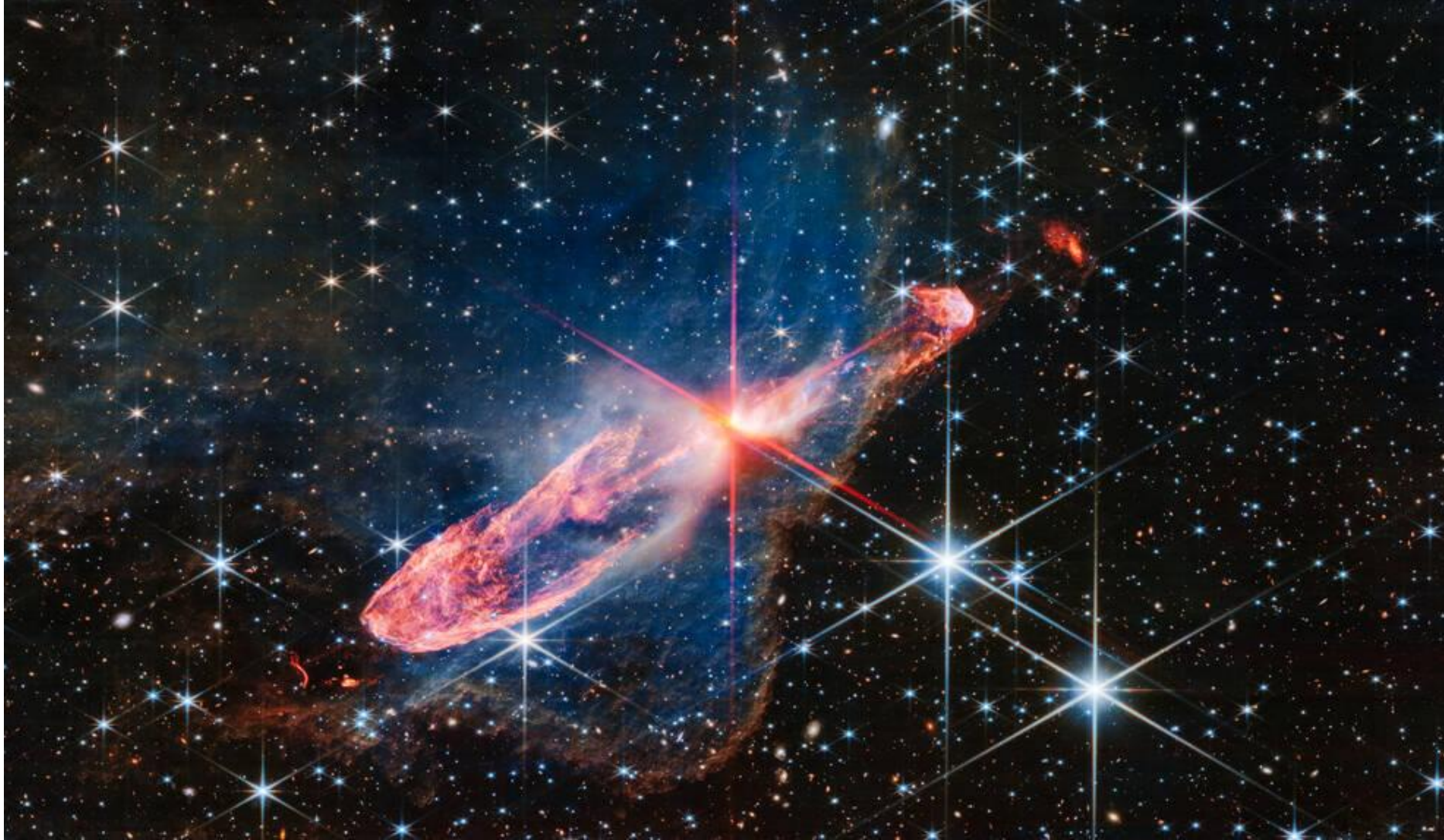


Read our monthly newsletter
nisenet.org/newsletter

Follow NISE Net on social networking
nisenet.org/social

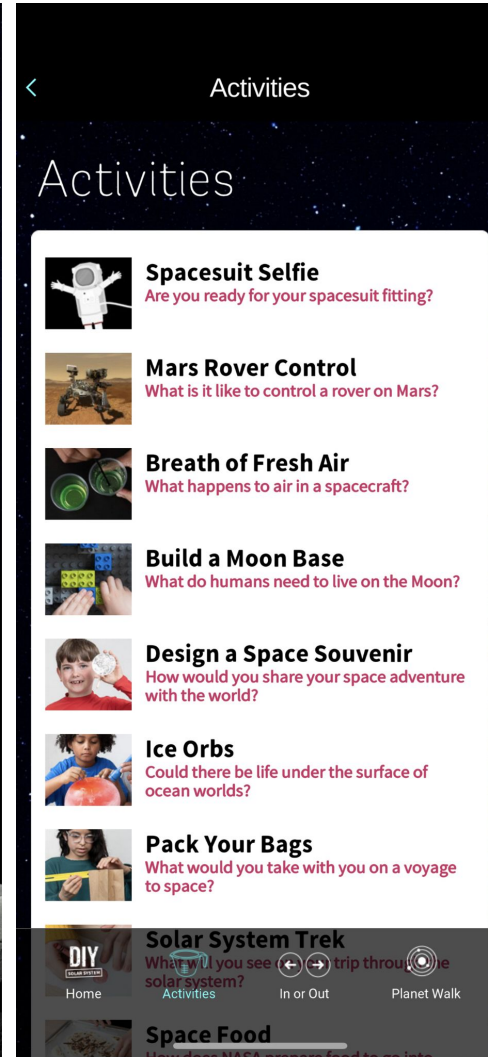
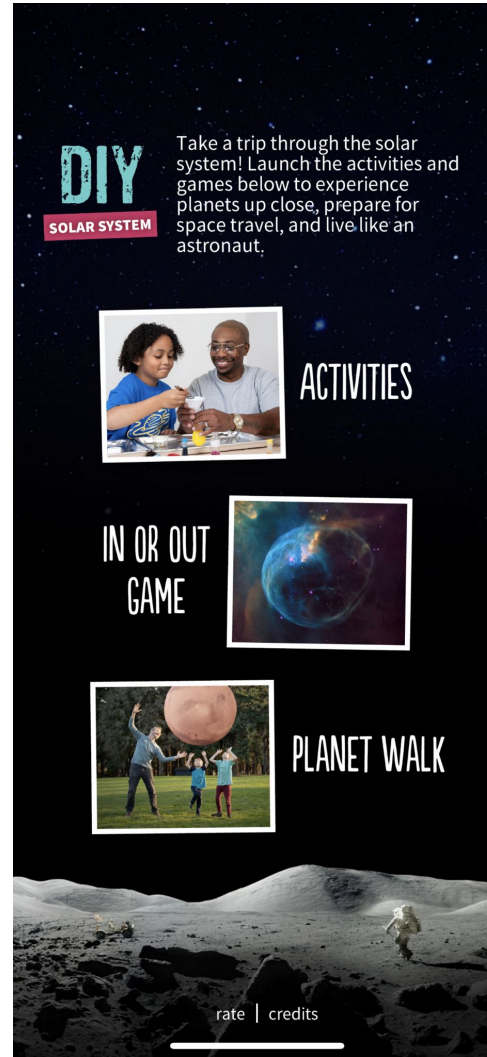
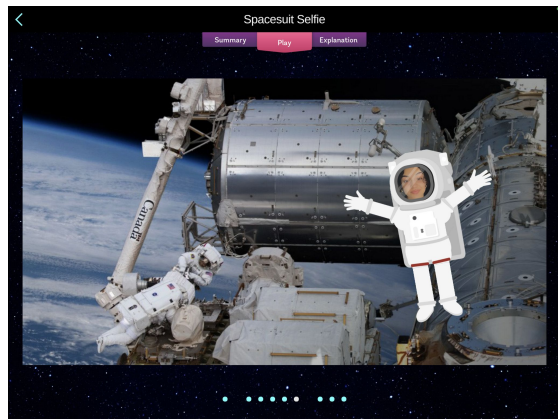
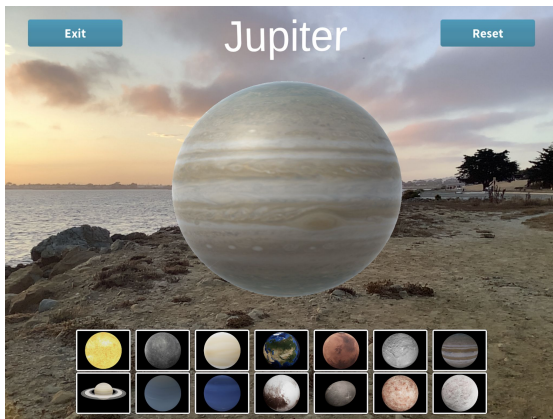


Webb Resources



Hands-on Activities, Professional Learning, and More: nisenet.org/Webb

DIY Solar System App Now Available!



Now for
**iPhones
& iPads**



**Android
& Spanish
versions
coming later
in 2023**

Learn more & download from the App Store: nisenet.org/diy-solar-system-app

Explore Science: Voyage through the Solar System

Shipping Out Now!



2023 Online Workshops

Bubbling Up later this Year... 🐱

Eclipse Planning for October 14, 2023 - A
Review of the Newest Resources for Engaging
the Public

Tuesday, September 12, 2023

2pm-3pm Eastern / 11am-12pm Pacific

Fall Workshops TBA...

- Partner Eclipse Events
- Sustainable Practices



nisenet.org/events



Thank You



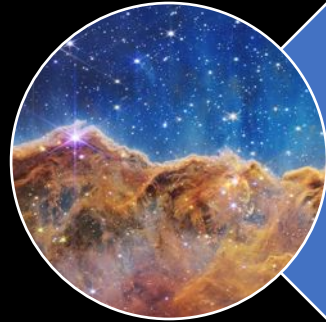
This project is made possible in part by the Institute of Museum and Library Services, Grant Number MG-245910-OMS-20.

This project is a continuation of the program established through support from the Rob and Melani Walton Foundation as part of Arizona State University's Rob and Melani Walton Sustainability in Science and Technology Museums initiative

Science Briefings



Cosmic Dust, from Solar Systems to Galaxies



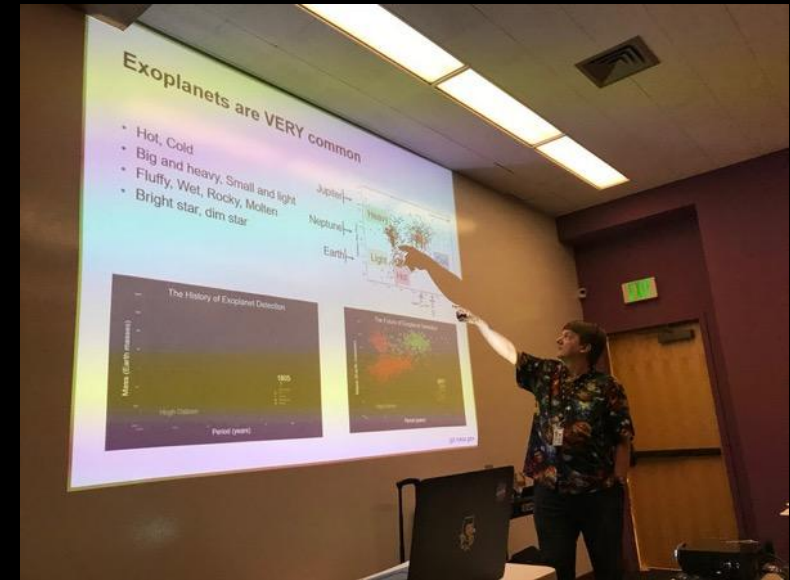
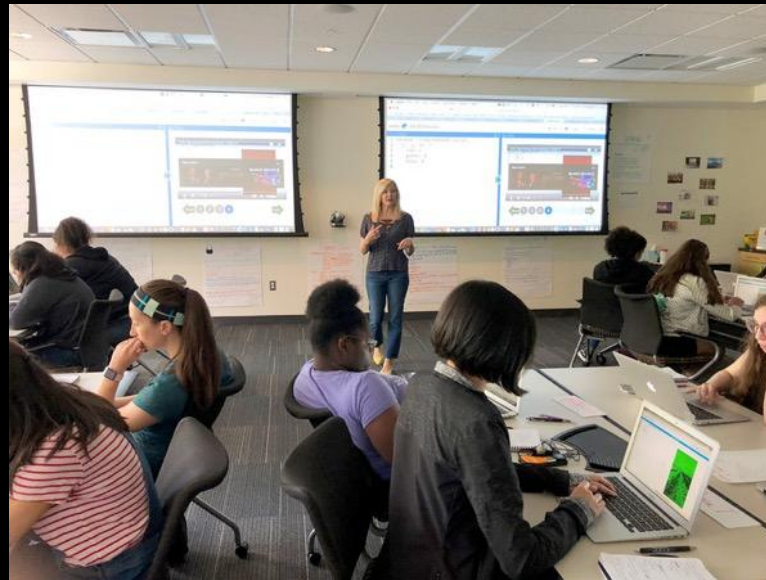
The Art of Science: Data Visualizations in Astronomy



Upcoming: October 5th, 2023
for the next science briefing
recording!

Subject Matter Experts

Connect with an expert on Webb through NASA's Universe of Learning.



<https://universe-of-learning.org/informal-educators/request-an-expert>