

WEBB

SPACE TELESCOPE

(Very) Early Science

Klaus Pontoppidan

JWST Project Scientist, STScI

JSTUC

July 25, 2022



The beginning

- JWST has now begun regular science observations
- ERO data released on July 13, new public data almost daily.
- Visit webbtelescope.org for all public outreach content
- jwst.stsci.edu for news, observing schedules, calls for proposals, etc.



Early Release Observations (“First Images”)

- Targets prioritized by ERO Committee
 - Representation from NASA, ESA, CSA, STScI
- Include observations from all 4 instruments, highlight contributions from all partners (NASA, ESA, CSA)
- Covering all of Webb’s science themes
- 120 hours of time
 - Unreleased observations to be used for press images in the next couple of months.
- STScI team of >30 scientists, visualization artists, writers, designers
- Observations obtained between June 3 and July 1, 2022
- 5 image releases
 - Exoplanet
 - Star-forming region
 - Planetary nebula
 - Interacting galaxies
 - Deep field





Mode representation

Target	NIRCam imaging	MIRI Imaging	MIRI IFU	NIRSpec IFU	NIRSpec MOS	NIRISS SOSS	NIRISS WFSS
NGC 3324 (in Carina)	X	X					
Stephan's Quintet	X	X	X	X			
Southern Ring	X	X					
WASP 96b						X	
SMACS J0723	X	X			X		X



ERO Production Team

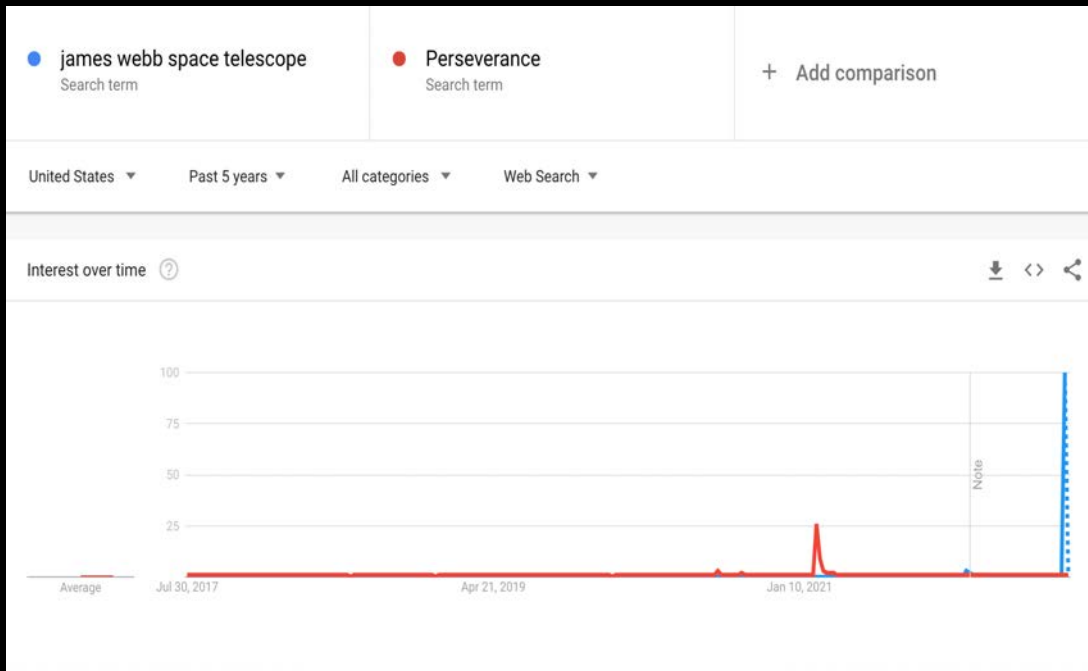
- The Early Release Observations and associated materials were developed, executed, and compiled by the ERO production team:

Claire Blome, Hannah Braun, Matthew Brown, Margaret Carruthers, Dan Coe, Joseph DePasquale, Nestor Espinoza, Macarena Garcia Marin, Karl Gordon, Alaina Henry, Leah Hustak, Andi James, Ann Jenkins, Anton Koekemoer, Stephanie LaMassa, David Law, Alexandra Lockwood, Amaya Moro-Martin, Susan Mullally, Alyssa Pagan, Dani Player, Klaus Pontoppidan, Charles Proffitt, Christine Pulliam, Leah Ramsay, Swara Ravindranath, Neill Reid, Massimo Roberto, Elena Sabbi, Leonardo Ubeda

- The EROs were also made possible by the foundational efforts and support from the JWST instruments, STScI planning and scheduling, Data Management teams, and Office of Public Outreach.

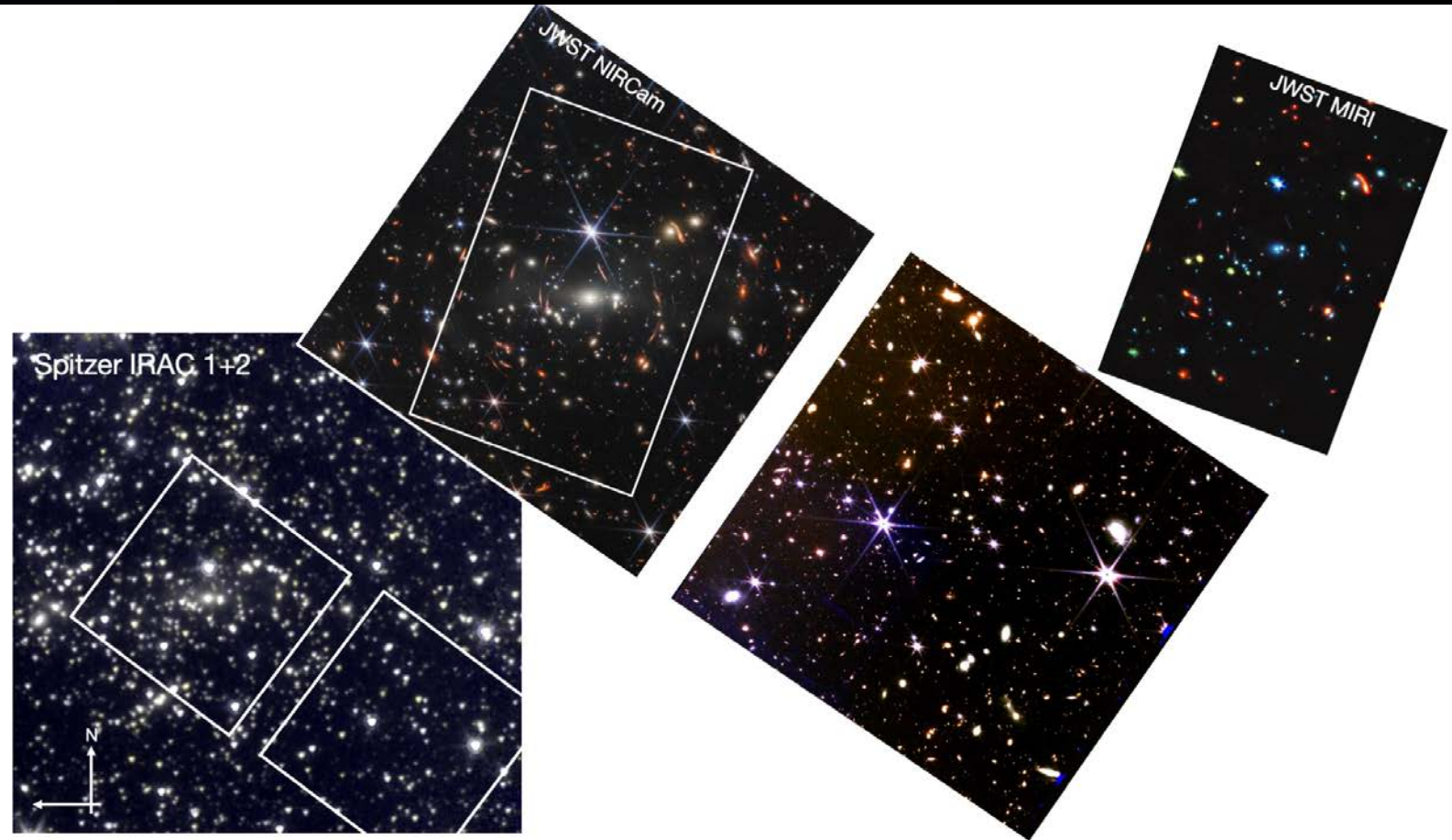


A few benchmark metrics





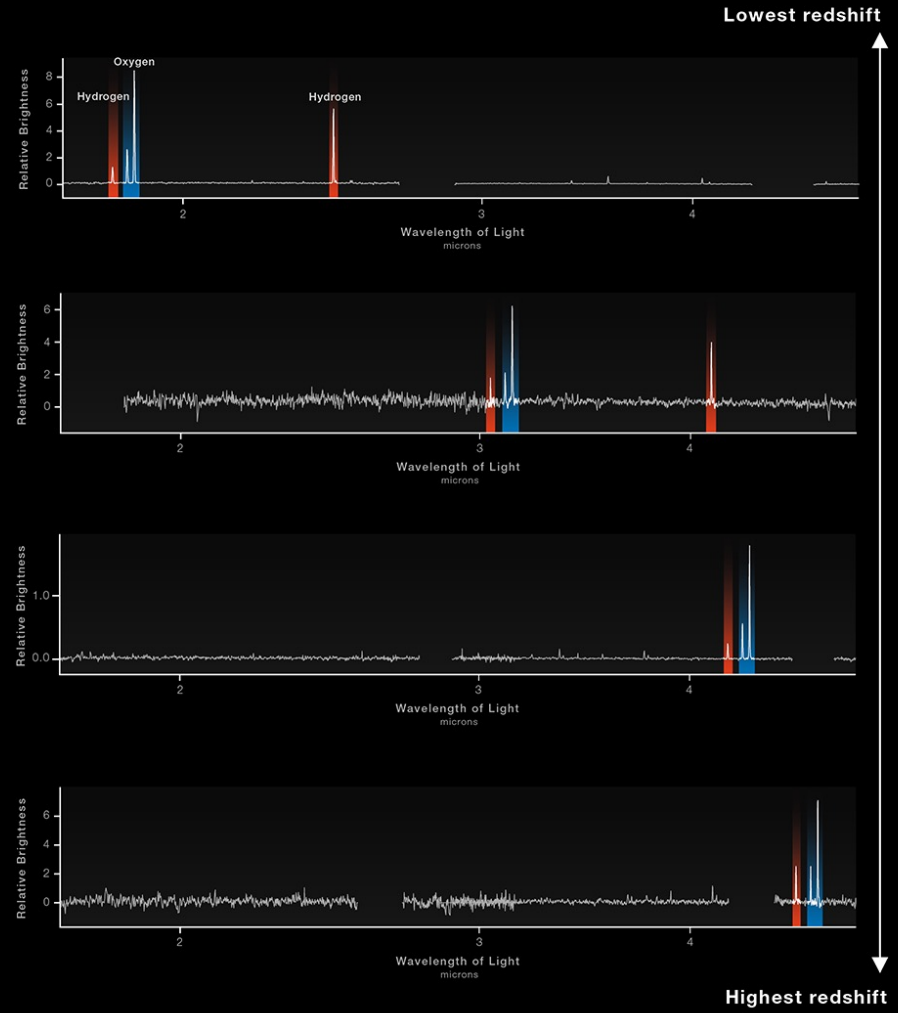
SMACS J0723



NIRCam Imaging



NIRSpec Microshutter Array Spectroscopy

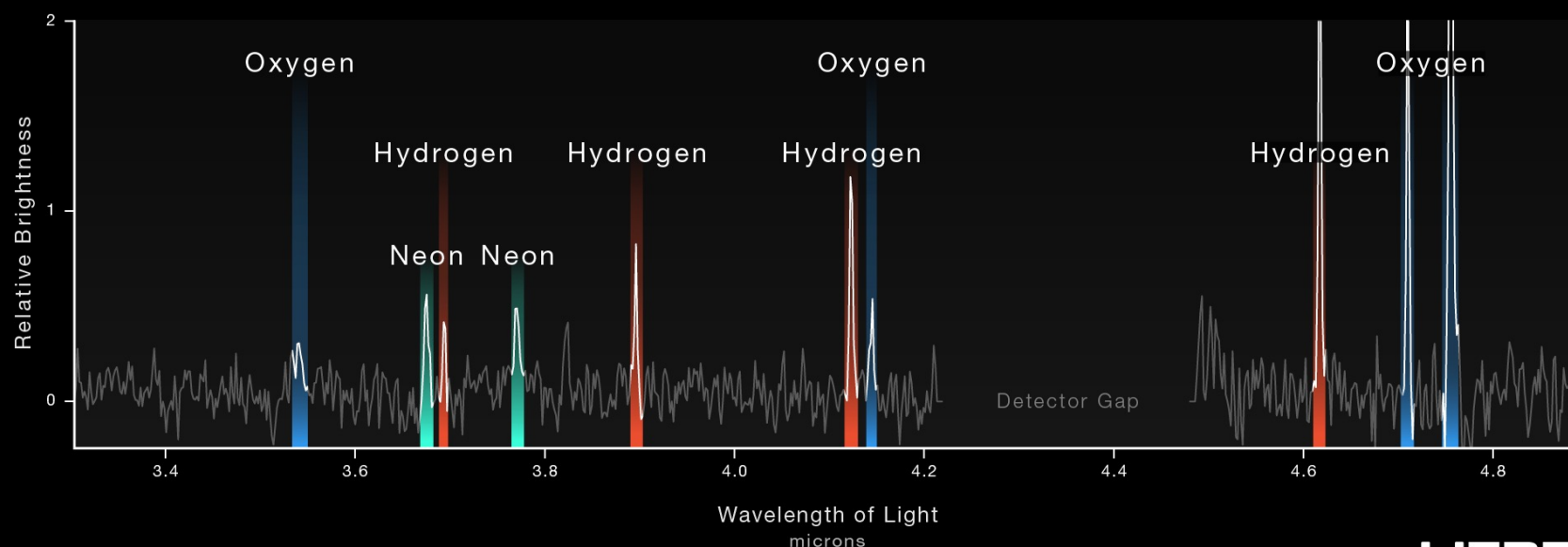


NIRCam Imaging



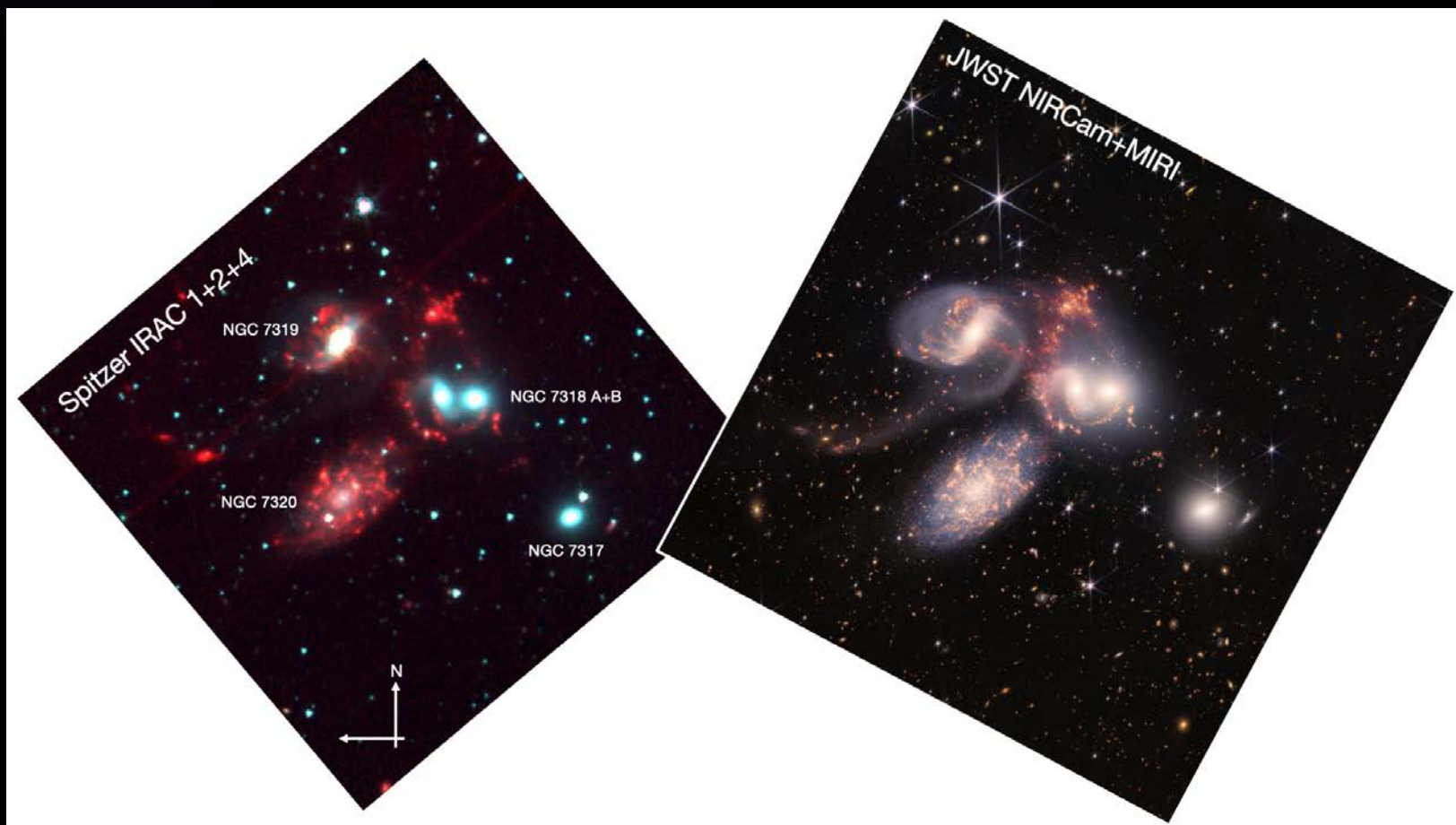
13.1 billion years

NIRSpec Microshutter Array Spectroscopy





Stephan's quintet



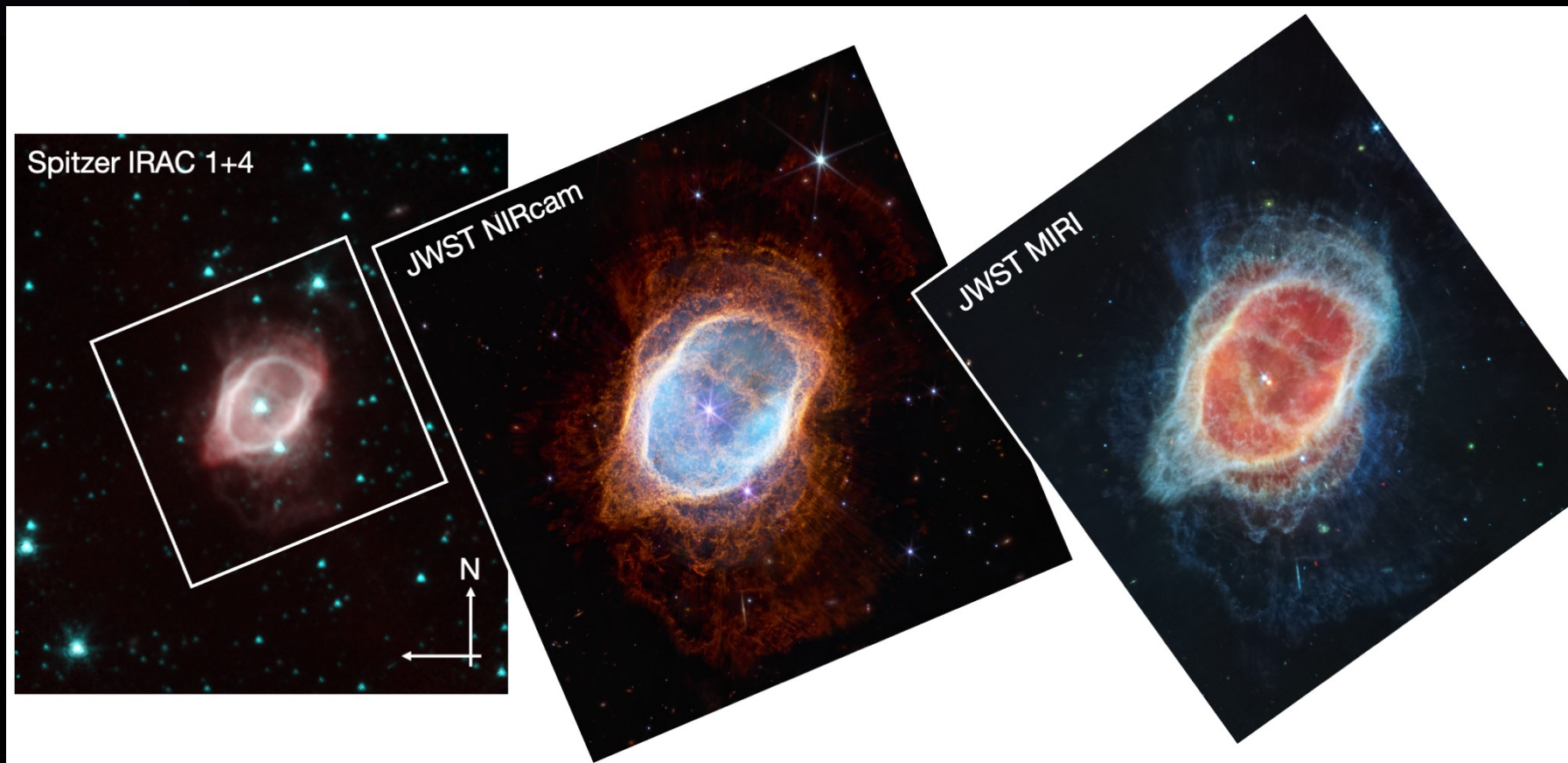


Carina (NGC 3324)





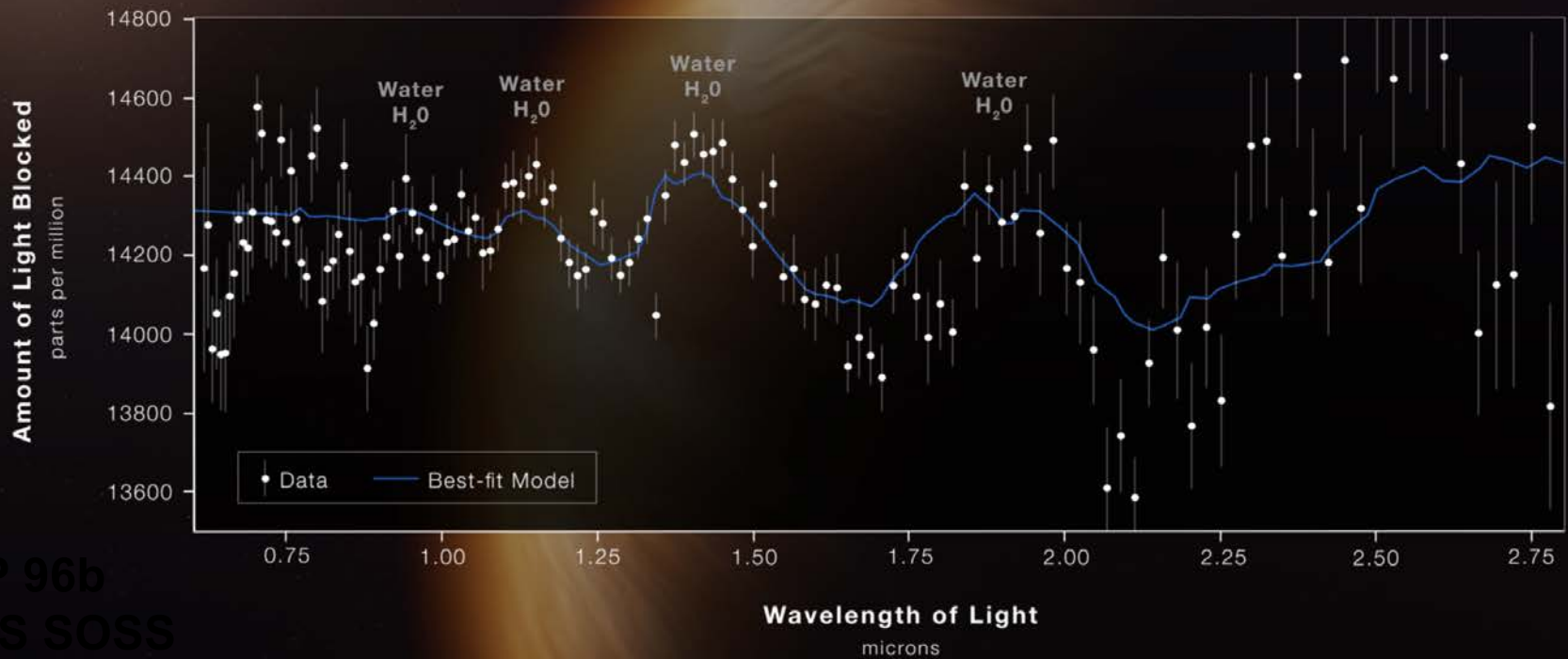
Southern Ring



HOT GAS GIANT EXOPLANET WASP-96 b

ATMOSPHERE COMPOSITION

NIRISS | Single-Object Slitless Spectroscopy



WASP 96b
NIRISS SOSS



ERS Observations

- GLASS (Treu)
 - Imaging complete
- GOALS (Armus)
 - 14 visits observed (2 scheduled)
- CEERS (Finkelstein)
 - Imaging complete
- TEMPLATES (Rigby)
 - 4 visits observed (1 scheduled)
- Q3D (Wylezalek)
 - One NIRSpec IFU observation
- Exoplanet Transits (Batalha)
 - 2 transits observed (2 more scheduled)
- HCI of planets (Hinkley)
 - 13 visits observed, 6 scheduled
- Jupiter (de Pater)
 - Partly scheduled
- PDRS4ALL (Berne)
 - Not yet observed
- IceAge (McClure)
 - NIRCам WFSS, MRS, IFU, FS observed
- Wolf-Rayet (Lau)
 - 6/9 visits observed, 1 failed + 2 skipped (to be repeated)
- Resolved Stellar Populations (Weisz)
 - Complete



M74 / Treasury-PHANGS / Janice Lee / Judy Smith



THE WHITE HOUSE
WASHINGTON



JAMES WEBB

SPACE TELESCOPE



The large screen on the stage displays a video conference. Three participants are shown in hexagonal frames: a man in a suit at the top, a woman with glasses in the middle, and a man in a suit at the bottom. The background of the screen is a starry space scene. The NASA logo is visible in the bottom corners of the hexagonal frames.



Mark Hamill ✓
@MarkHamill · [Follow](#)



[#BeenThere__DestroyedThat](#)



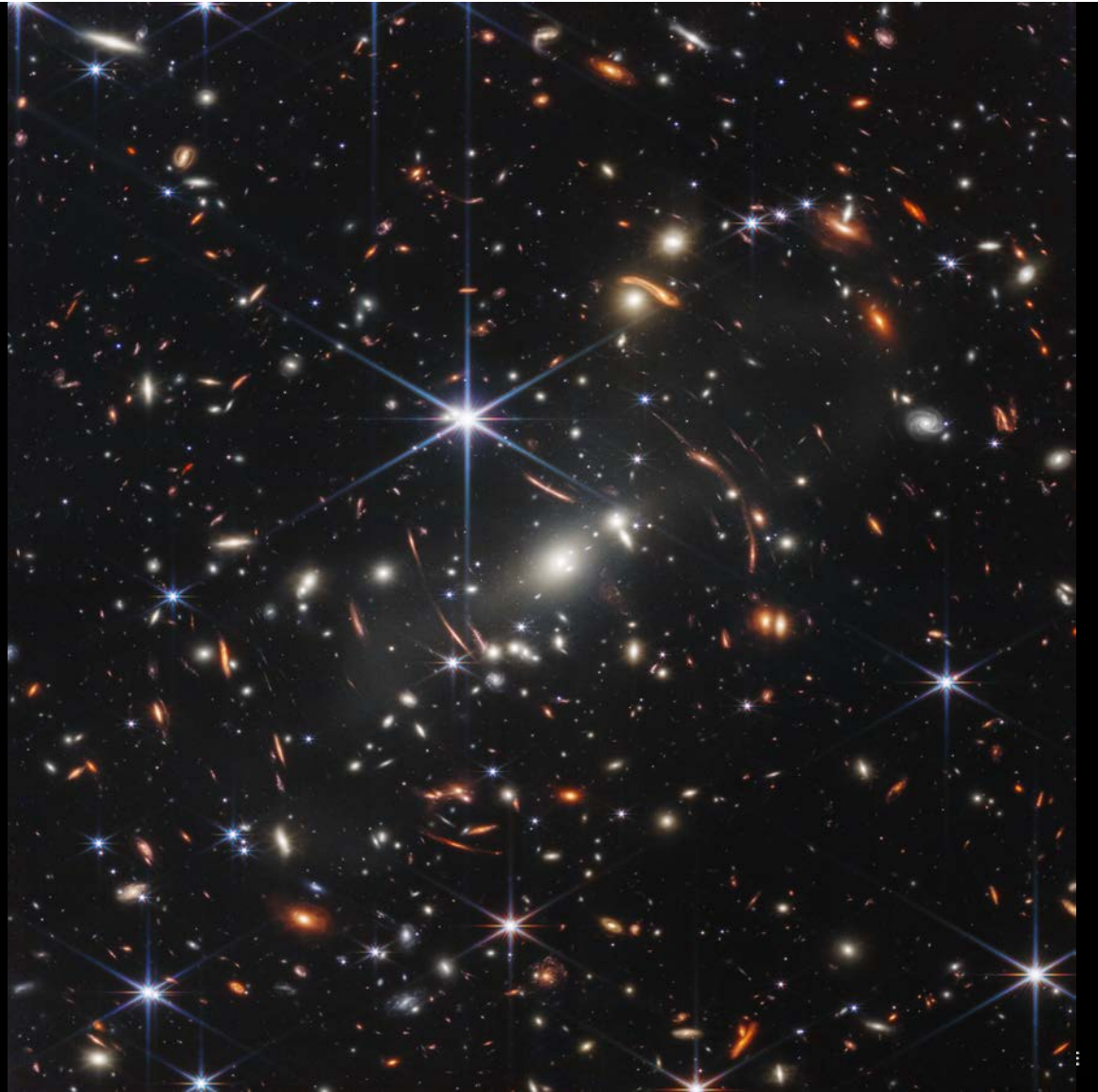
1:32 PM · Jul 15, 2022



BACKUP

SMACS J0723 Deep Field

- **NIRCam image**
 - F090W, F150W, F200W, F277W, F356W, F444W
 - 7,500s per filter (2 observed simultaneously)
 - Depth of AB~30 mag at 1-4 micron (point source, 5 sigma)
- **MIRI image**
 - F770W, F1000W, F1500W, F1800W
 - Depth of AB~26.5 mag at 7.7 micron
- Designed to reach Hubble Ultra Deep Field depth, but better due to high ecliptic latitude (-73 degrees) and better performance overall.

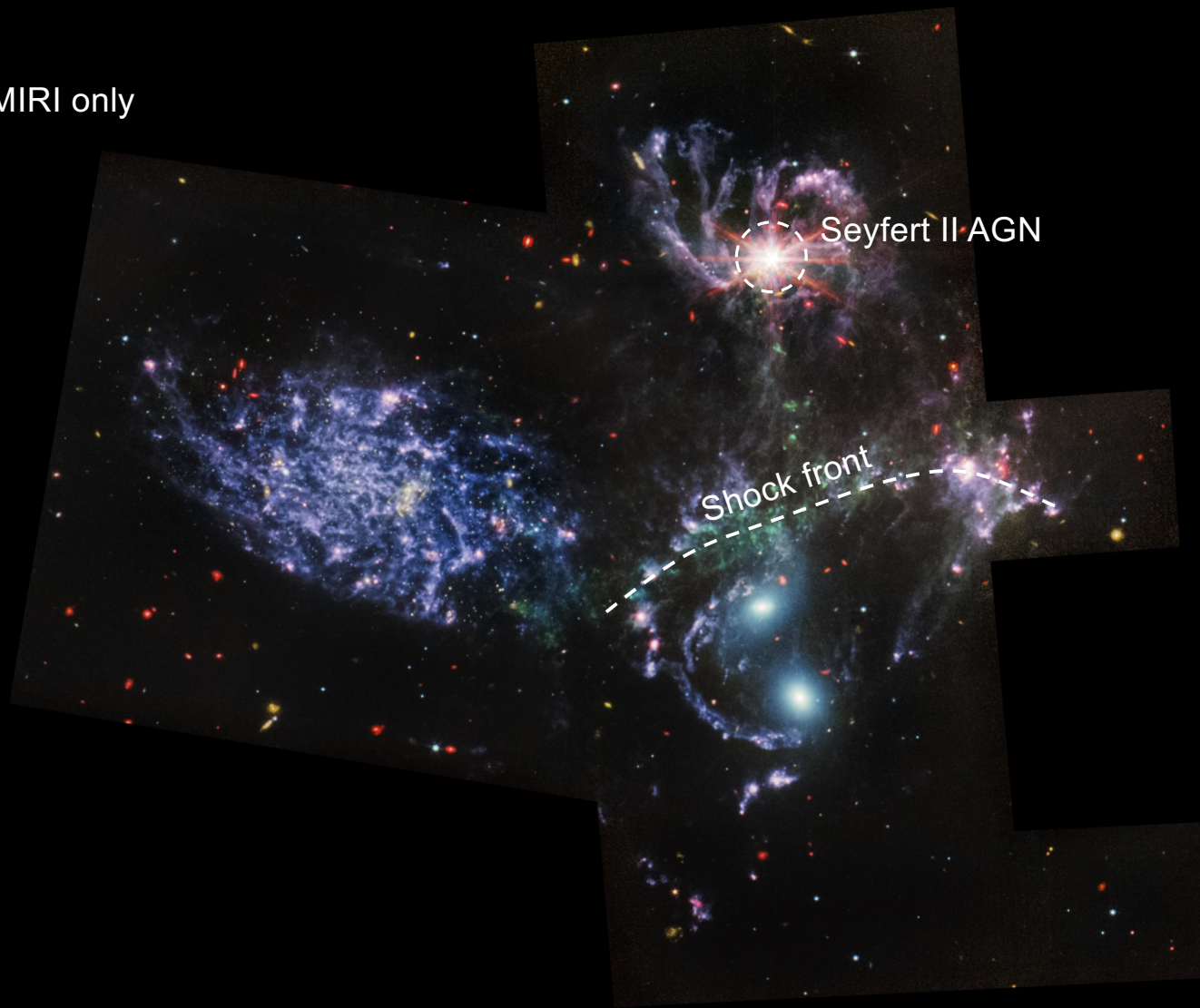


Stephan's Quintet

- NIRC*am* image
 - F090W, F150W, F200W, F277W, F356W, F444W
 - 2,400s per filter
 - Depth of AB~29 mag at 1-4 micron (point source, 5 sigma)
 - Almost HUDF levels!
 - 3-tile mosaic for ~150 Mpix
- MIRI image
 - F770W, F1000W, F1500W



MIRI only



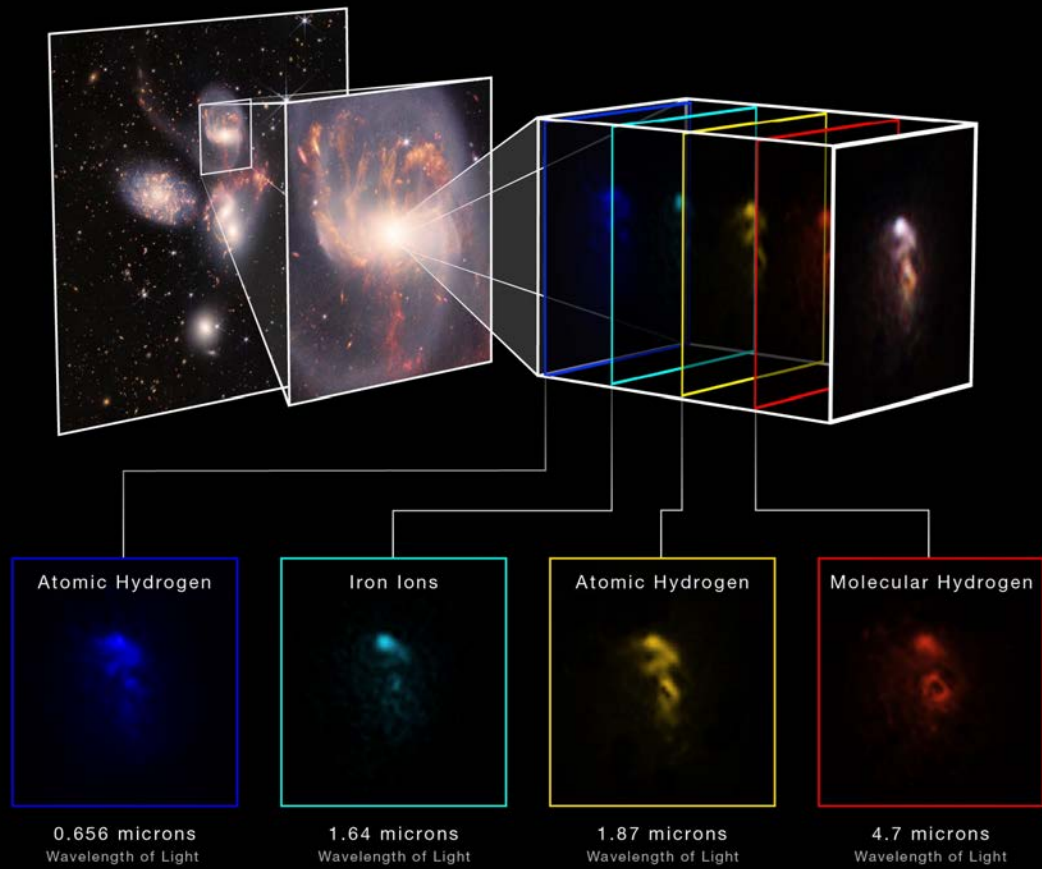
INTERACTING GALAXIES | STEPHAN'S QUINTET

COMPOSITION OF GAS AROUND ACTIVE BLACK HOLE

- NIRSpec IFU
- R~100 prism
- 1300 s

NIRCam and MIRI Imaging

NIRSpec IFU Spectroscopy



WEBB
SPACE TELESCOPE

STScI | SPACE TELESCOPE
SCIENCE INSTITUTE

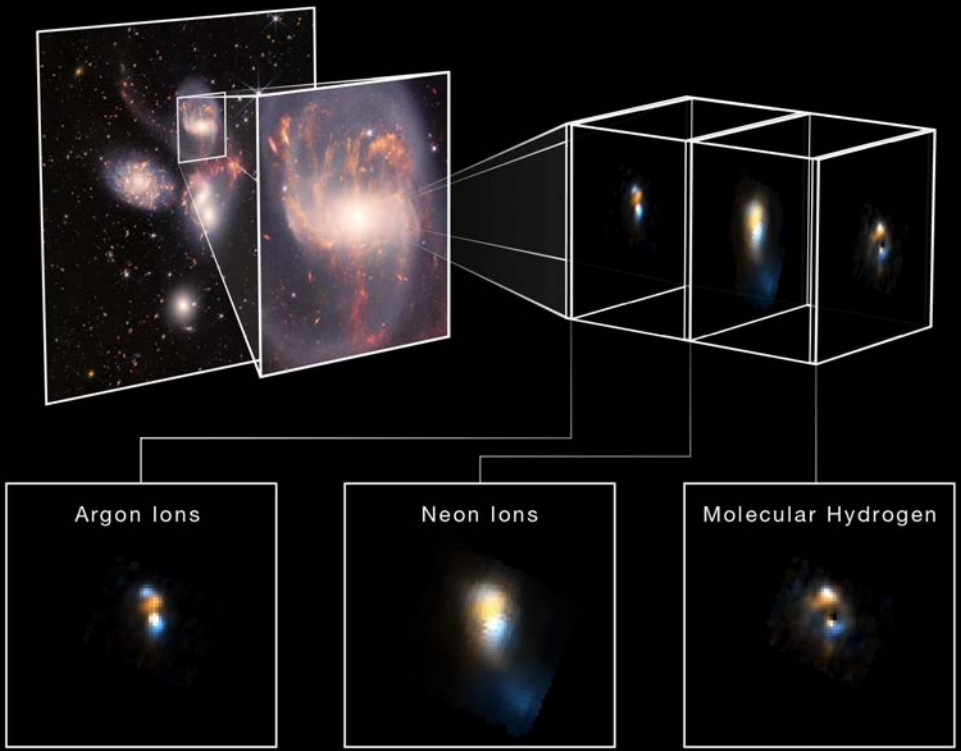
- MIRI MRS
- 4.9-28 micron
- 900 s

INTERACTING GALAXIES | STEPHAN'S QUINTET

VELOCITY OF GAS NEAR ACTIVE BLACK HOLE

NIRCam and MIRI Imaging

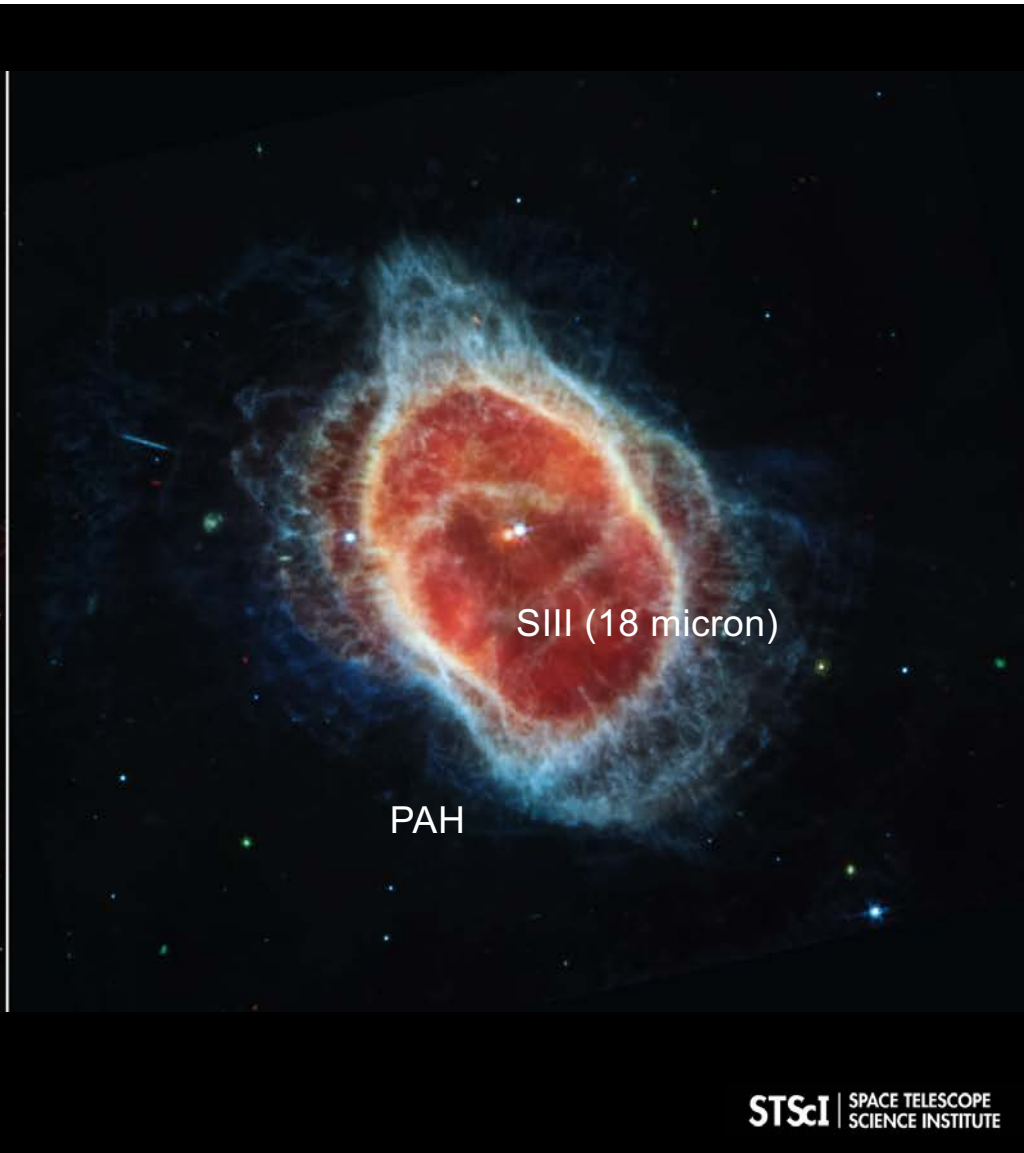
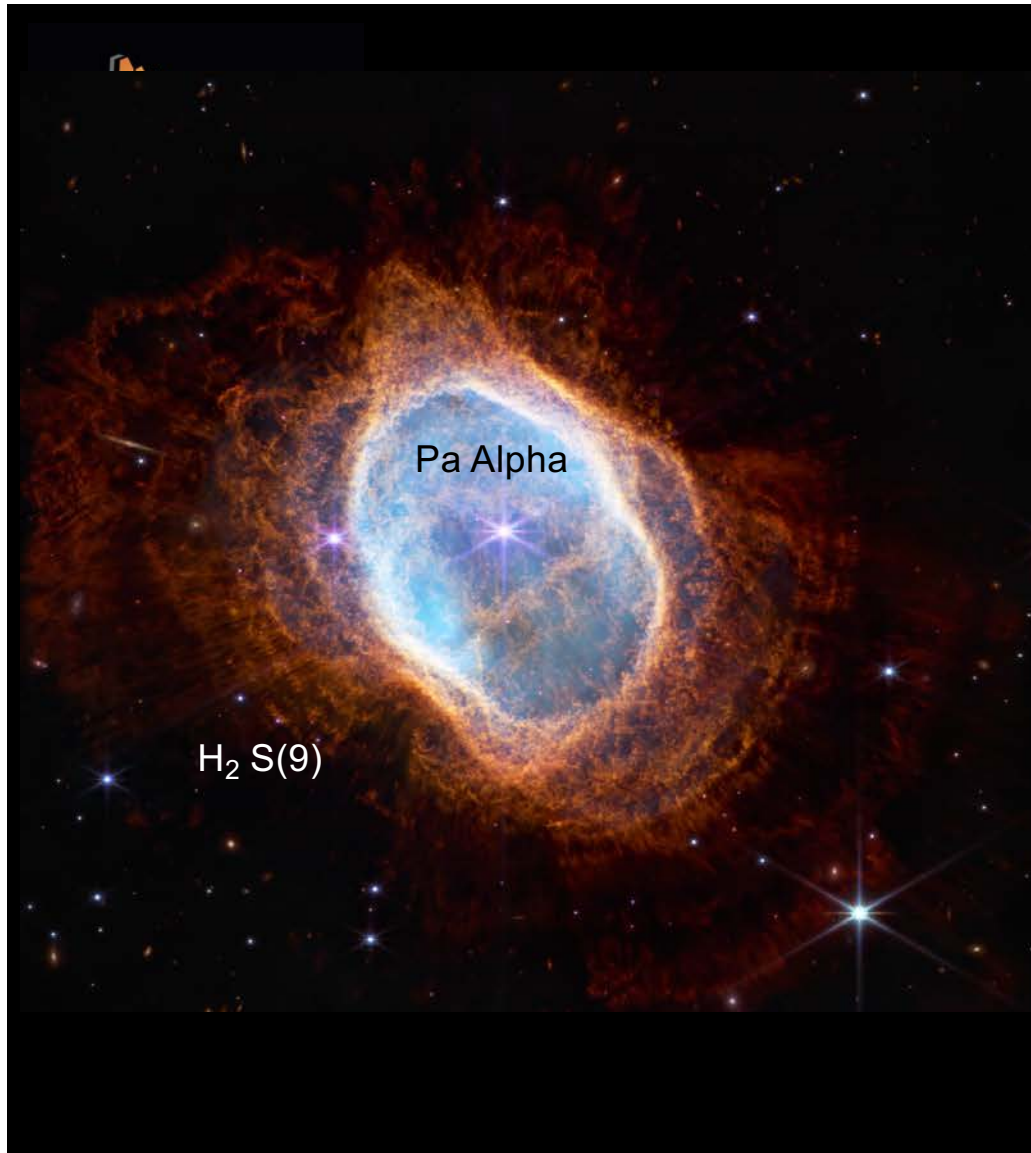
MIRI IFU Medium Resolution Spectroscopy

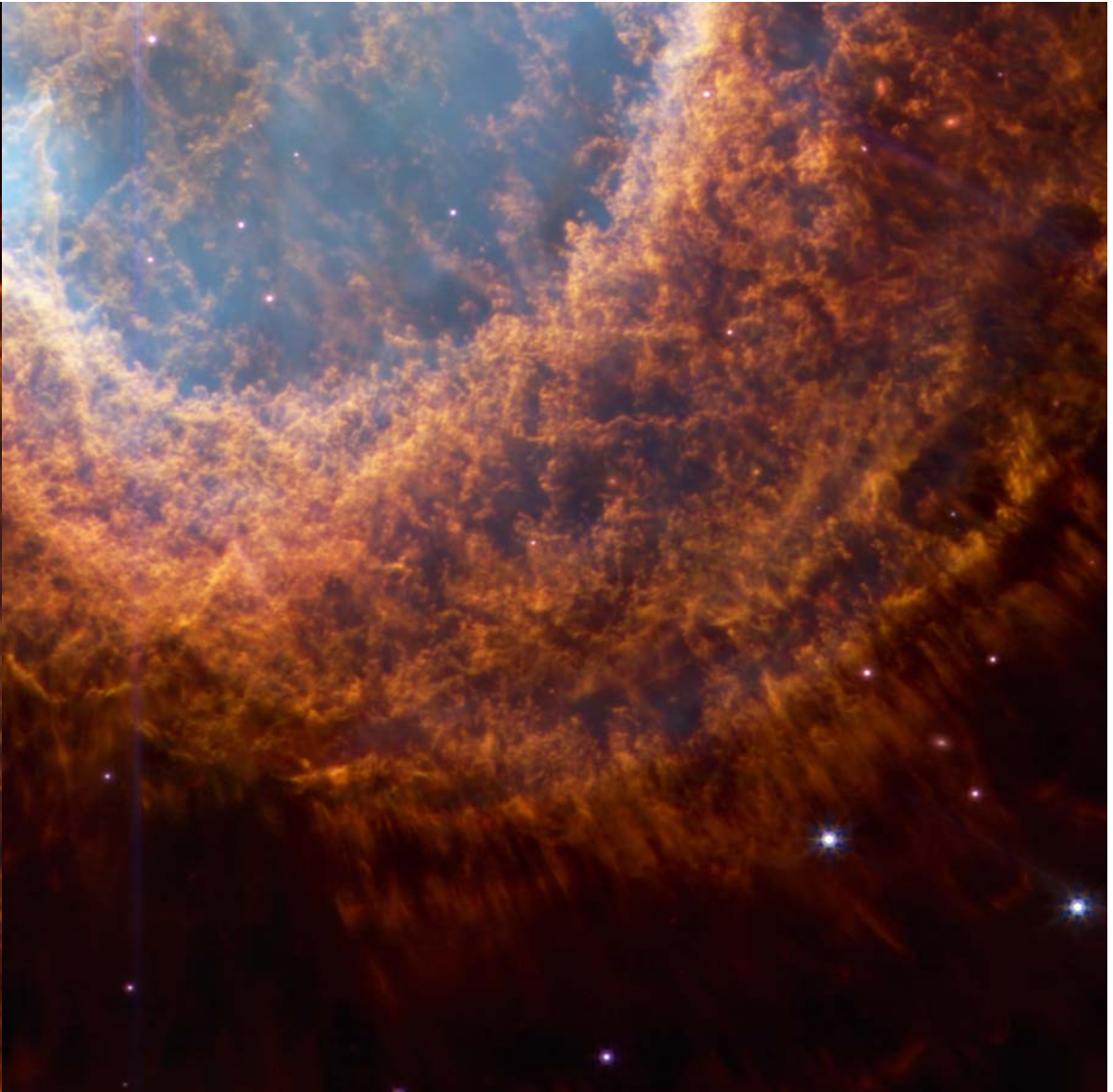


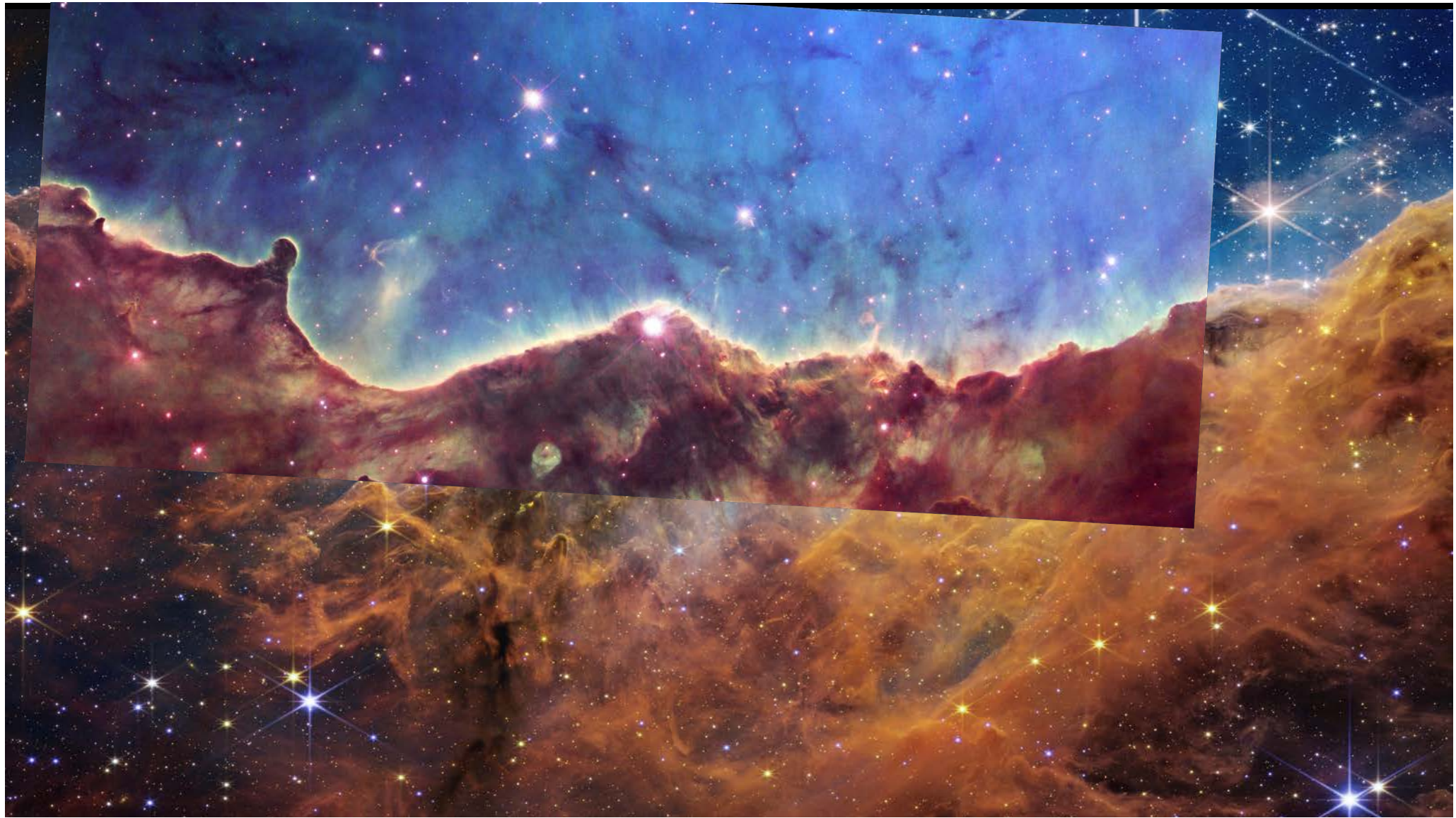
Toward
-200
kilometers per second

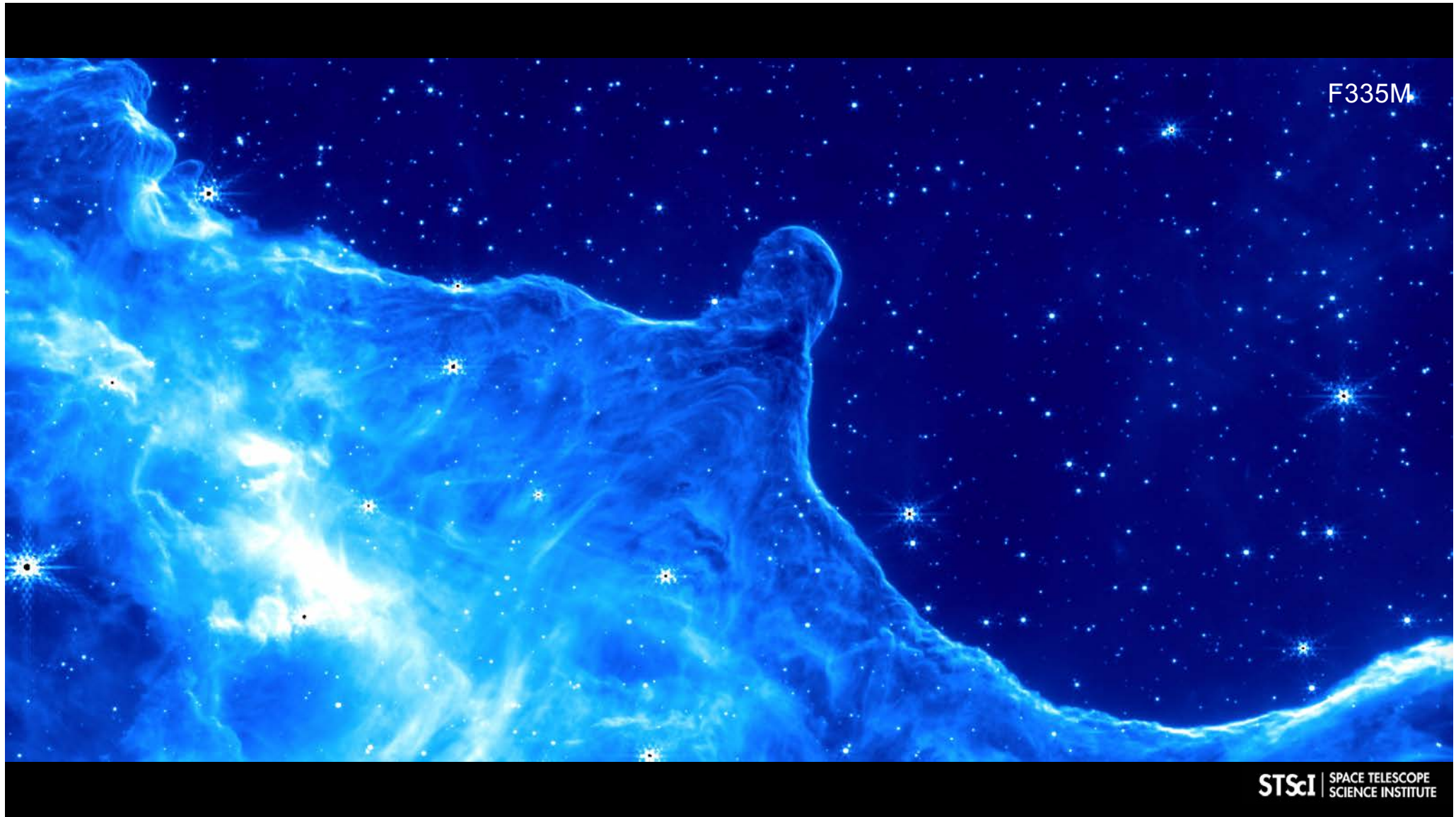
0
kilometers per second

Away
+200
kilometers per second









F335M