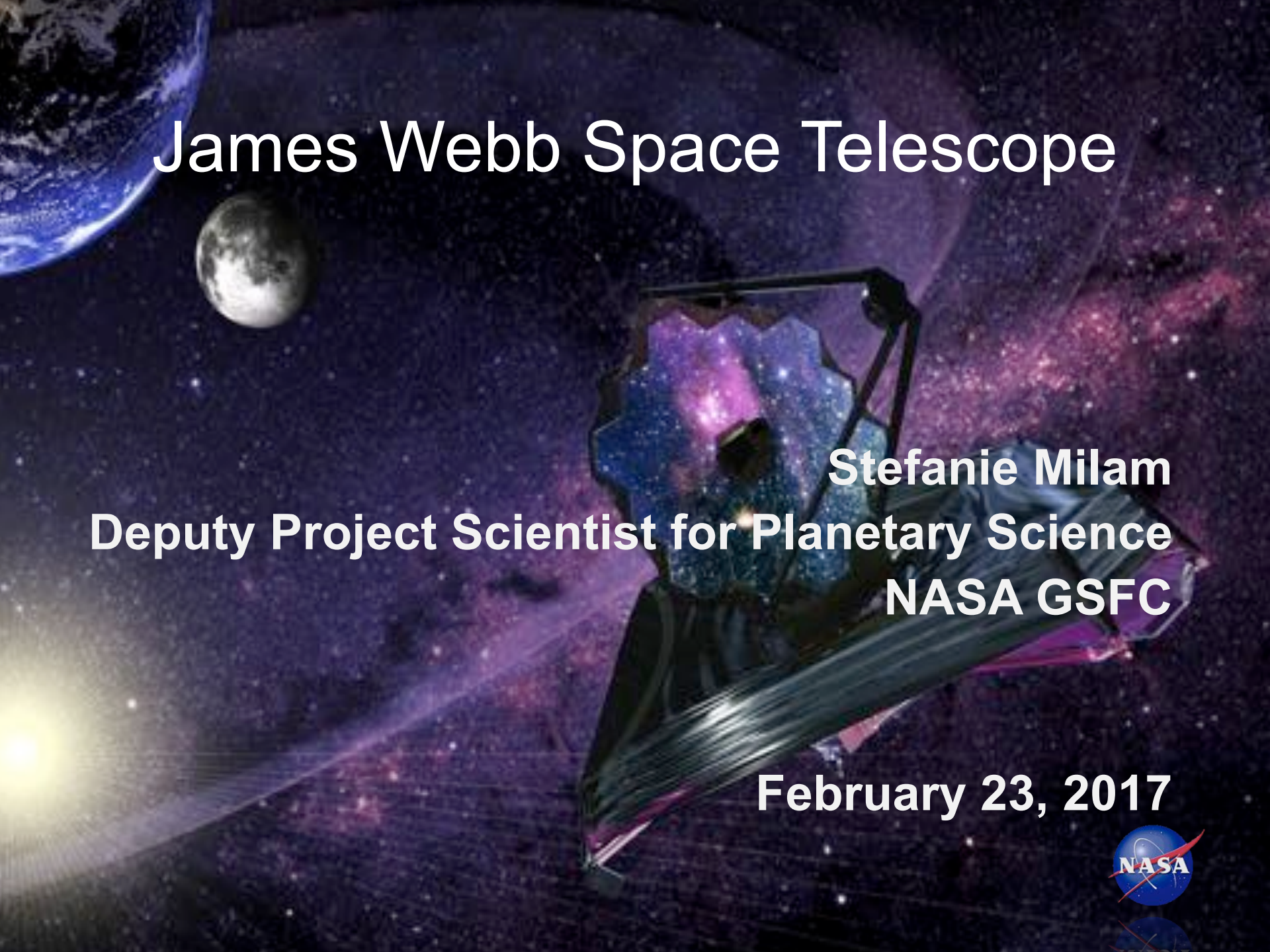


James Webb Space Telescope

Stefanie Milam
Deputy Project Scientist for Planetary Science
NASA GSFC

February 23, 2017

JWST Vital Stats

- General Observatory: 5 years required; 10 years goal
- Primary mirror: 21.3 feet (6.5 meters), in 18 segments
- Sunshield: 5 layer, 69.5 feet by 46.5 feet (21.2 meters by 14.2 meters
- Orbit: 930,000 miles (1.5 million kilometers) from Earth around (and avoiding) L2 point
- Operating temperature: Below 50 Kelvin (–370° Fahrenheit)
- Four Science Instruments covering 0.6–28.5 microns (diffraction limited at 2 microns)
  - Filtered Imaging
  - Spectroscopy – Slit, Integral Field, Grism/Prism
  - Coronagraphy – Traditional Lyot + Four Quadrant Phase Masks
  - Aperture Mask Interferometry – Non-Redundant Mask (NRM)

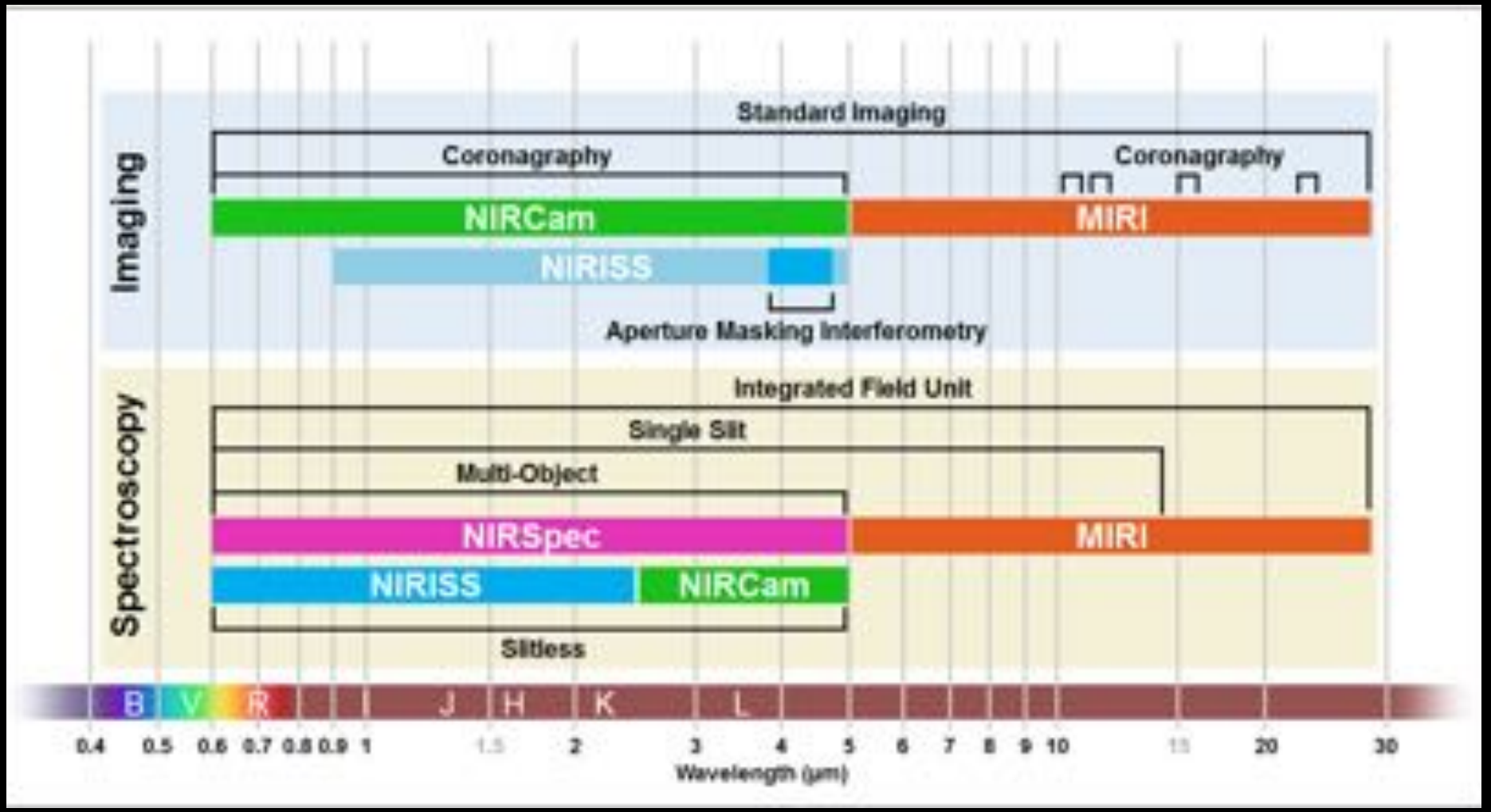
JWST Operations in one slide

- Annual call for proposals. Vast majority guest observers
- Non-sidereal tracking implemented, up to 30 mas/s
- Data pipelines will produce science-quality data
- Time-critical observations in special mode
- Targets of opportunity, with <2 day response
- Data archive
- GO funding
- Anticipated high over-subscription rate
- No Earth occultations.
- Targets available 2x/yr. 35% of sky available at a time.
- Antisun region is not observable.
- Very rich spectral datasets (MOS, IFU). Tools!

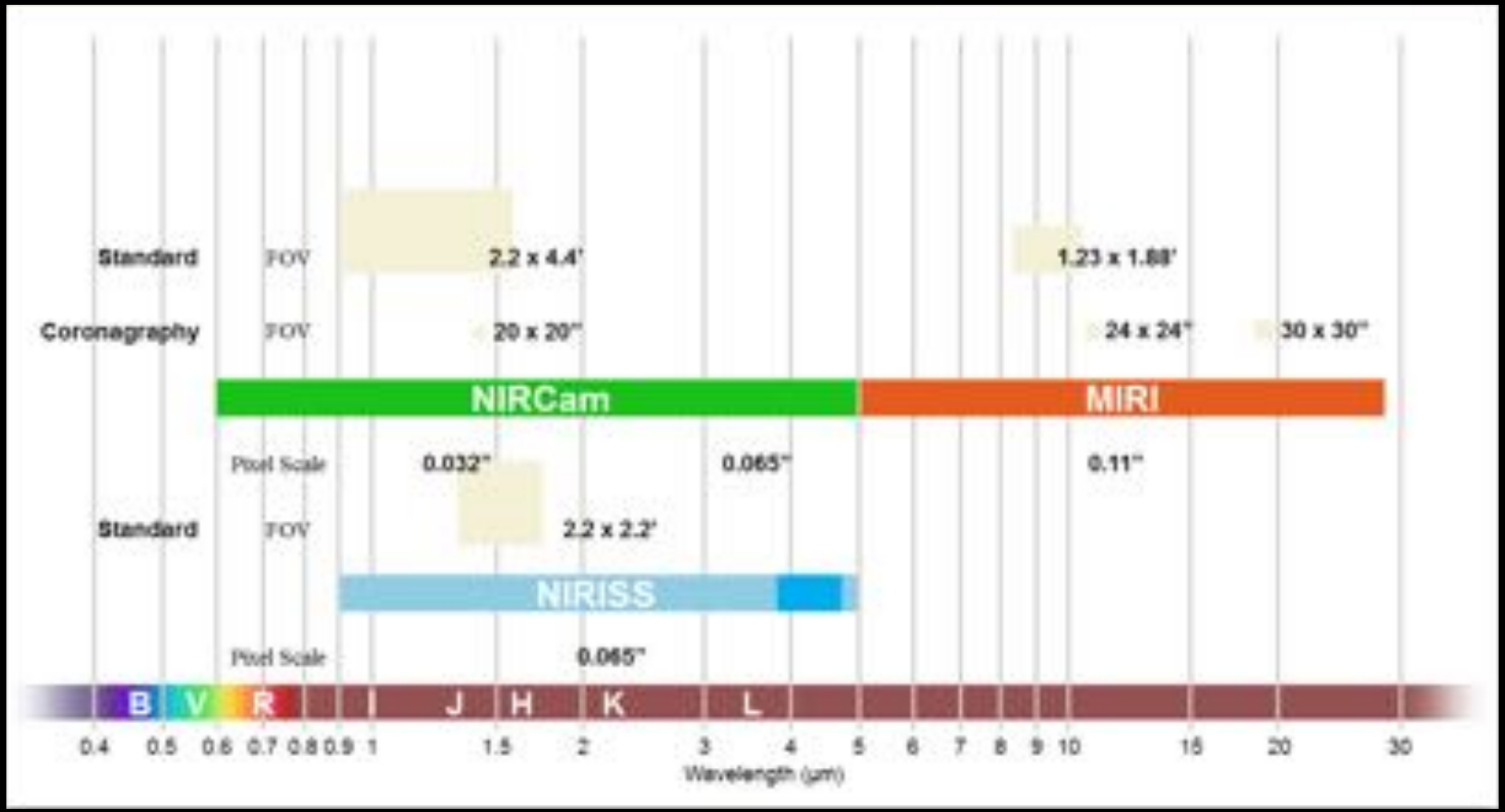
JWST Solar System Observing

- JWST **will** fully support Solar System observations
  - Planets, satellites & rings (Mars outward)
  - Asteroids, KBOs, and comets
- Non-sidereal tracking implemented
  - Rates up to 30 mas/sec (108 "/hr) for Cycle 1 (maybe higher for Cycle 2)
    - Covers everything except fastest NEOs, comets
  - Ephemeris represented as 5th O polynomial, 0.4 mas accuracy
  - Jitter ~7 mas over 1000 sec

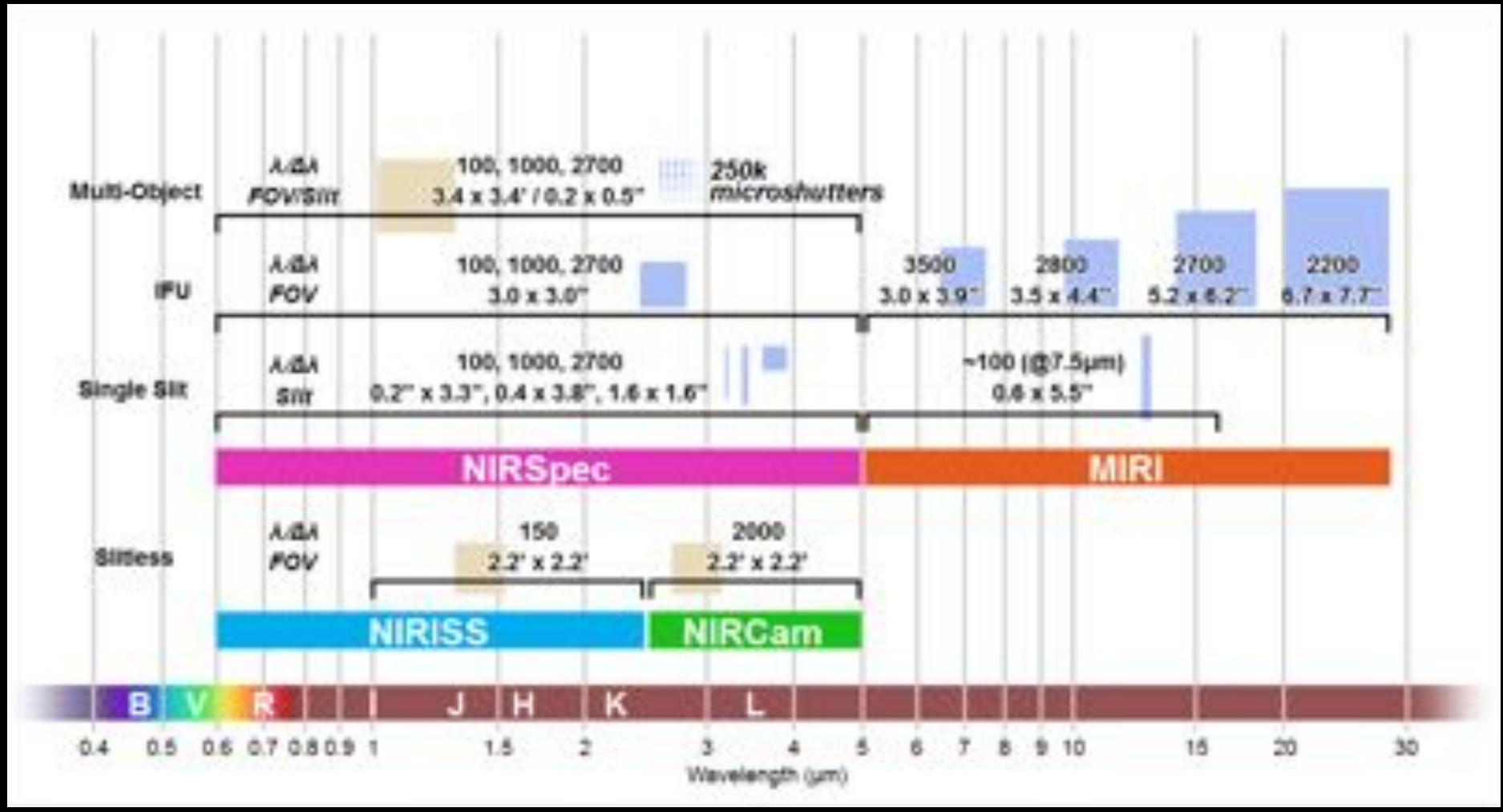
JWST Instrumentation



Imaging Modes



Spectroscopic Modes



JWST Status (February 2017)

Yearly Themes

2013: Instrument Integration: The Science instruments will be finished and begin their testing as an integrated science payload

2014: Manufacturing the Spacecraft: Construction will commence on the spacecraft that will carry the science instruments and the telescope

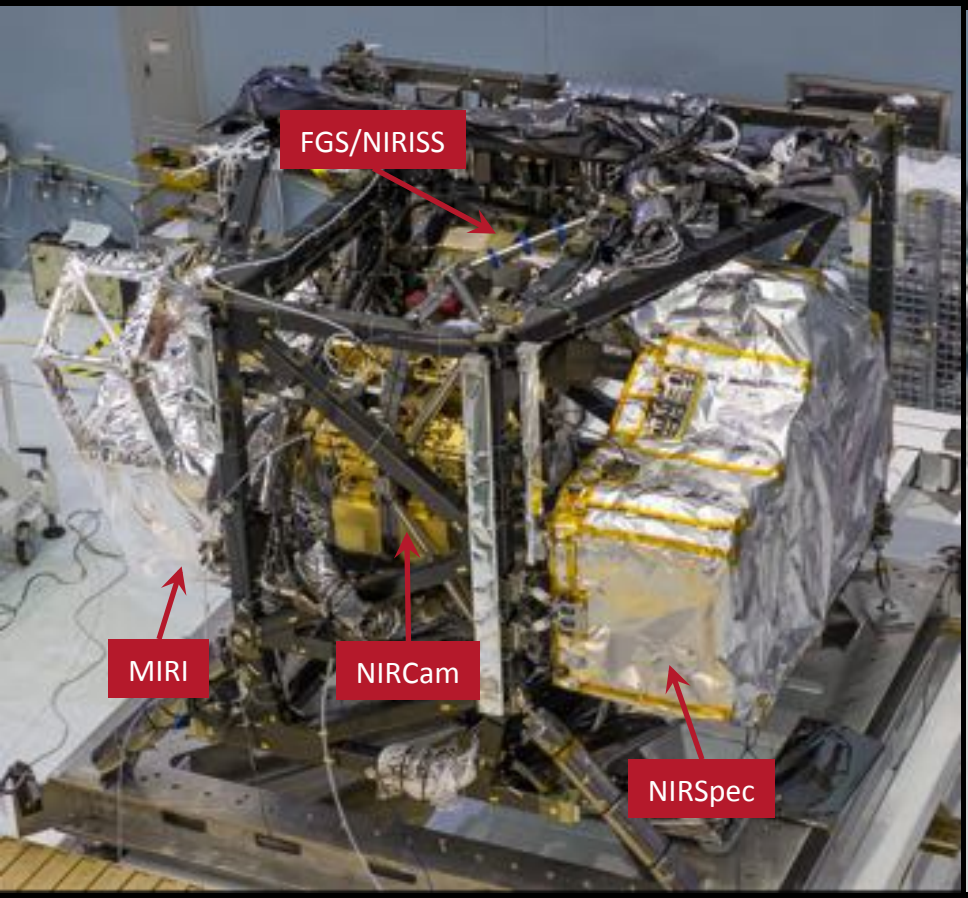
2015: Assembling the Mirror: The mirror segments, secondary mirror and aft optics will all be assembled into the telescope

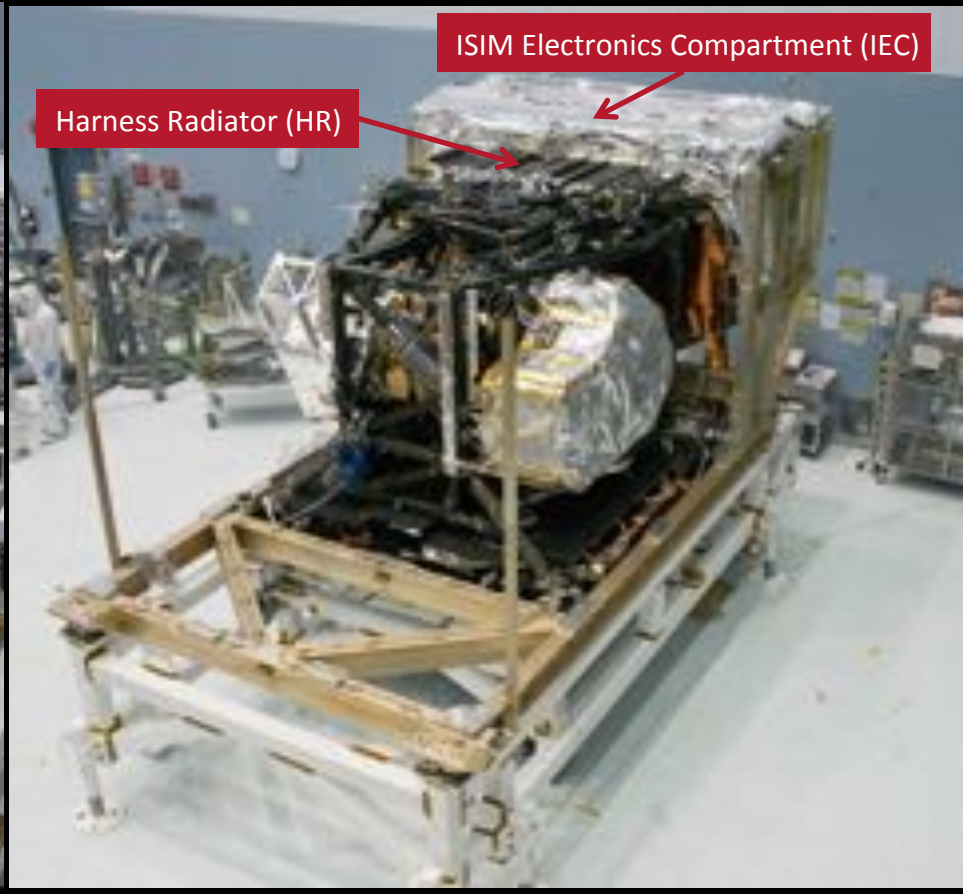
2016: Observatory Assembly: The three main components of the observatory will be completed (instruments, telescope, spacecraft)

2017: Observatory Testing: The three main components of the observatory will be tested and readied for assembly (instruments, telescope, spacecraft) into a single unit

2018: Kourou Countdown: All parts of the observatory will be brought together, tested and readied for launch in Kourou, French Guiana

Flight ISIM test configuration





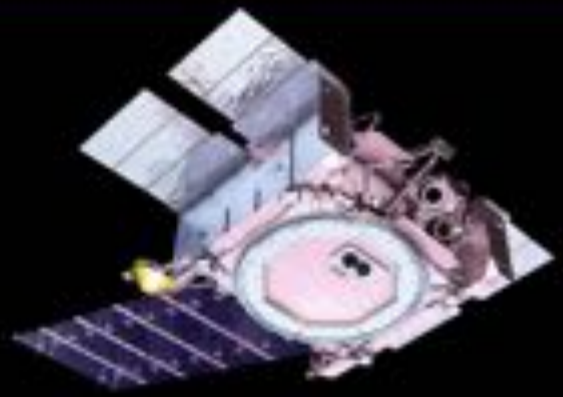
Mirror Installation #MirrorSeason

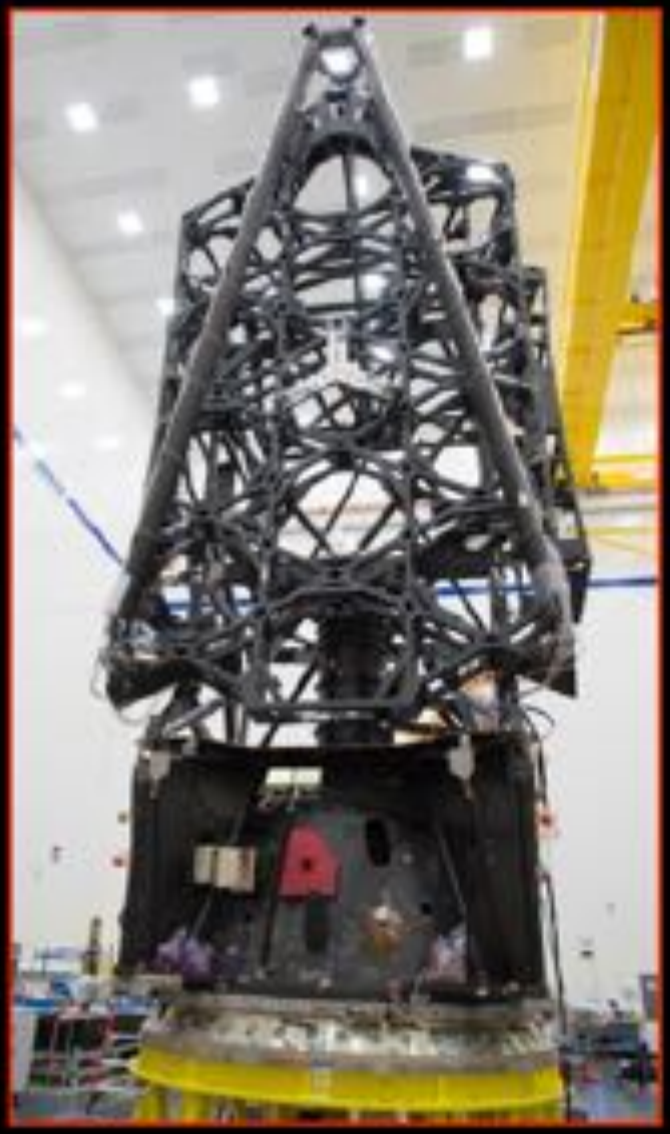
ISIM Installation

- Acoustic and Vibration tests at GSFC early 2017.
- Currently underway.

2017: Obse
Chamber A

Spacecraft Bus - Complete

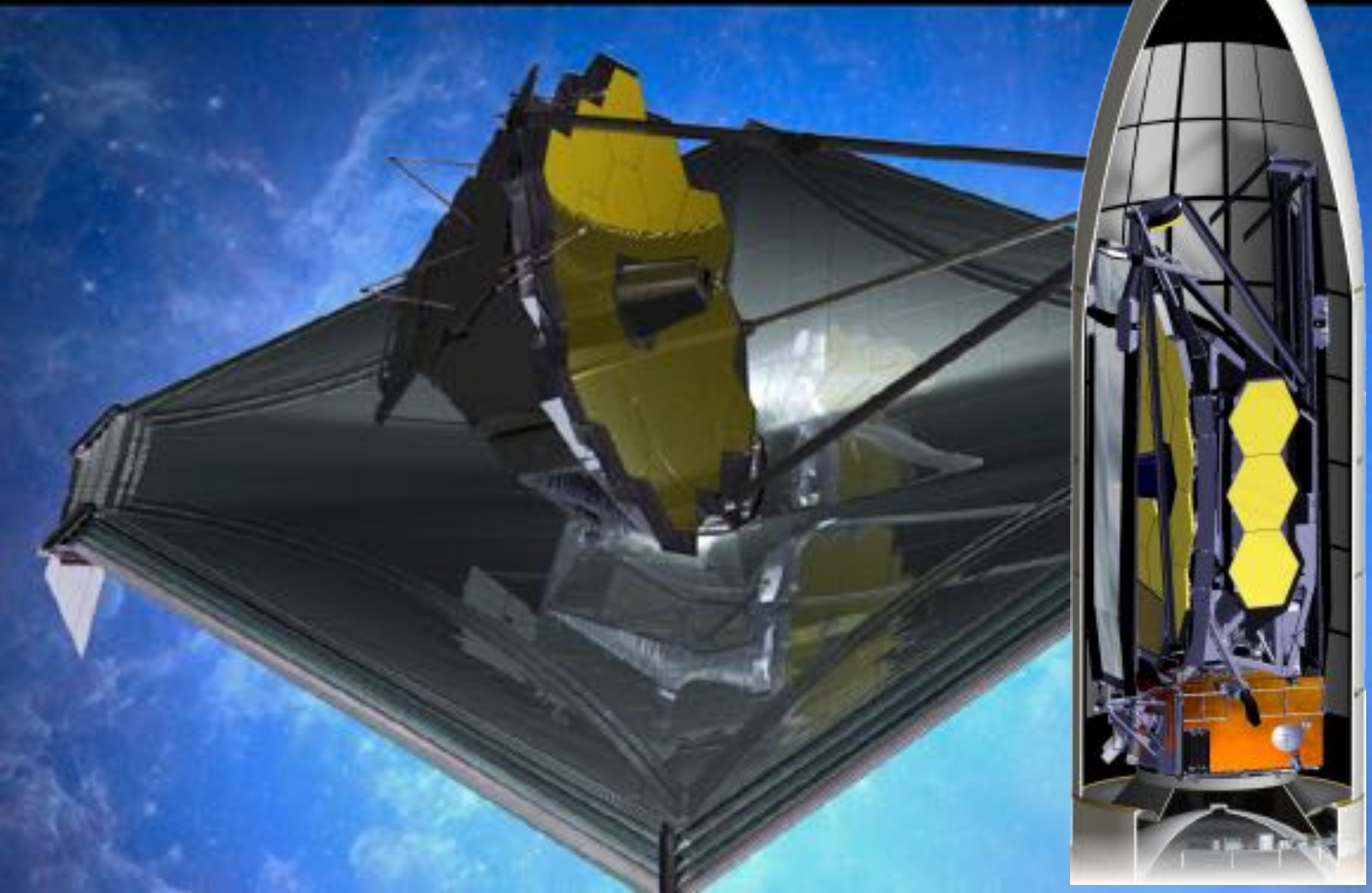




Sunshield Full Deployment Test

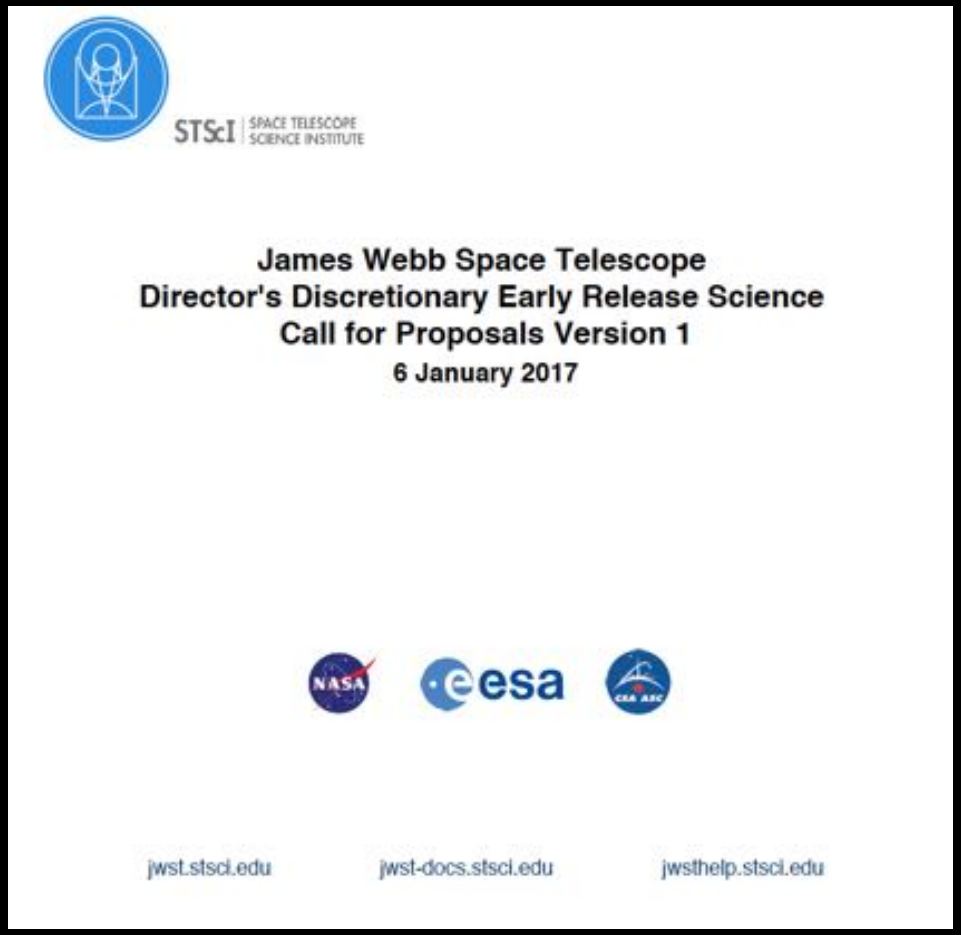
2018: Observatory integration and launch

sunshield + spacecraft + observatory



JWST Early Release Science

The JWST Director's Discretionary Early Release Science Program (DD ERS)



The DD ERS Call for Proposals is now available at jwst-docs.stsci.edu

DD ERS Motivation and Goals

Science Timeline Realities

04-2019	Cy1 science obs begin
07-2019	GTO Cy2 deadline
09-2019	GO Cy2 CP released
12 (early)-2019	GO Cy2 deadline
04-2020	Cy2 science obs begin

Availability of non-proprietary data is quite limited at time of Cy2 proposal preparation.

DD ERS Motivation and Goals

- *Ensure open access to representative datasets in support of Cy 2 proposal preparation.*
- *Engage broad cross-section of astronomical community in familiarizing themselves with JWST data and scientific capabilities.*

STScI Director Ken Sembach will allocate up to 500 hrs of DD time, and resources for up to 15 teams.

A multi-disciplinary committee of experts will recommend a suite of proposals that fulfills the goals of the DD ERS; makes optimal use of the available time; and spans JWST's science themes.

DD ERS Motivation and Goals

The DD ERS program is guided by the following five principles:

1. Projects must be substantive science demonstration programs that utilize key instrument modes to provide representative scientific datasets of broad interest to researchers in major astrophysical sub-disciplines.

2. Projects must design, create, and deliver science-enabling products to help the community understand JWST's capabilities.
   - Initial products must be delivered by release of Cy 2 GO CfP (Sep 2019).
   - Each project must define a core team to be responsible for timely delivery of products according to a proposed project management plan, with performance subject to periodic review.

DD ERS Motivation and Goals

The DD ERS program is guided by the following five principles:

3. Early execution
   - All observations schedulable within first 5 months of Cy 1 (expected Apr-Aug 2019), AND
   - a substantive subset of observations schedulable within first 3 months.
   - Target lists must be flexible to accommodate possible changes to scheduled start of science observations.

4. Data will have no proprietary time
   - Both raw and pipeline-processed data will enter public domain immediately after processing and validation at STScI

DD ERS Motivation and Goals

The DD ERS program is guided by the following five principles:

5. STScI recognizes and supports the benefits of having diverse and inclusive scientific teams involved in the formulation of ERS proposals.
    - Programs with diverse representation of community members in a given sub-discipline helps ensure that the investigations will be of broad interest.
    - Broad involvement facilitates the dissemination of JWST expertise through a more extensive network, and promotes more equitable participation in JWST scientific discovery.

DD ERS Evaluation Criteria

Assess potential of proposal to achieve goals of DD ERS.

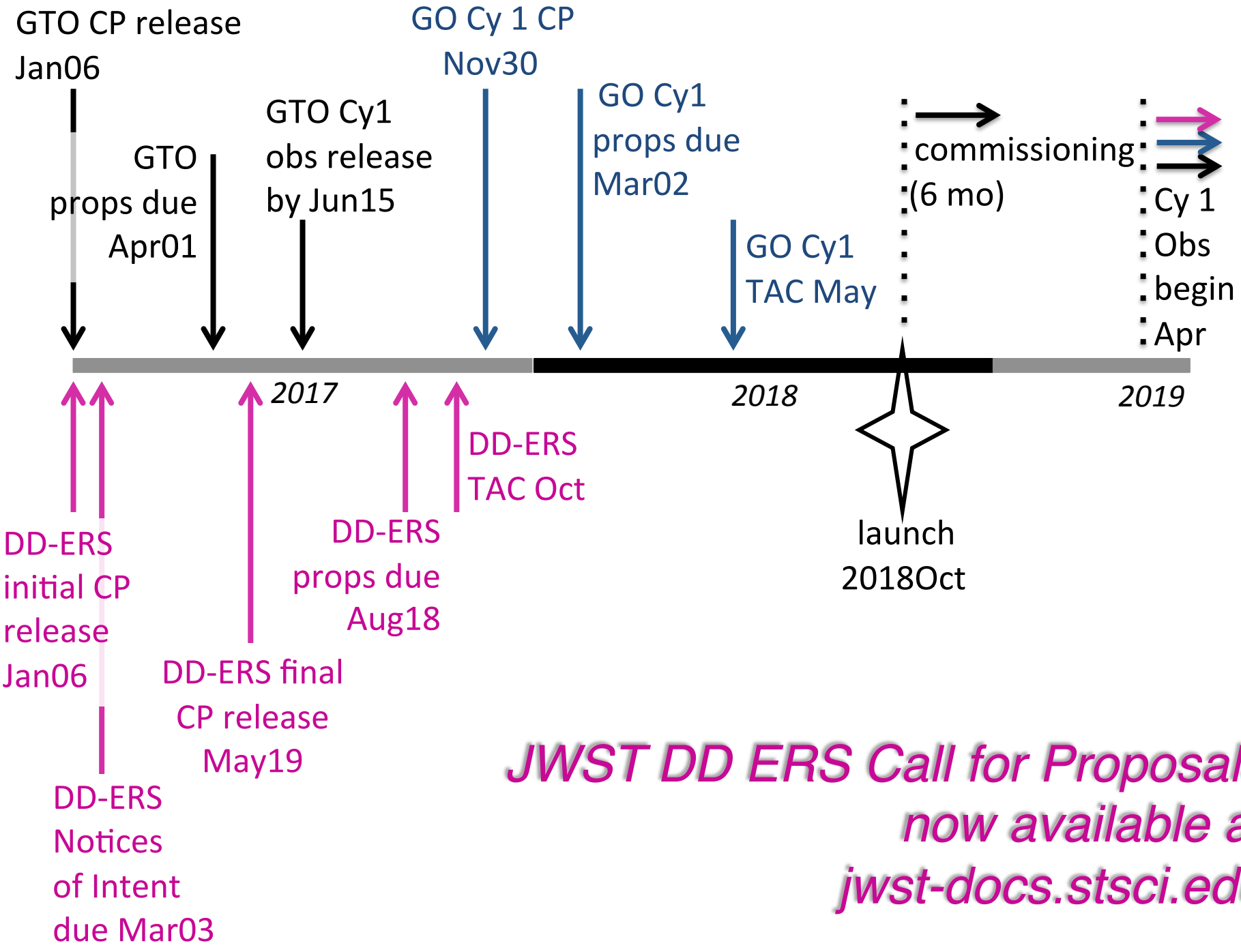
1. *Extent to which project will improve community understanding of JWST science capabilities and guide subsequent JWST observations.*

2. *Effectiveness in providing deliverables which include quantitative, data-related measurements that will support development of Cy 2 proposals.*

3. *Extent to which science-enabling products will be developed to enrich overall scientific return of mission.*

4. *Credibility of management plan for achieving project goals in a timely manner, particularly development and delivery of science-enabling products for community.*

5. *Overall scientific merit; significance to major astrophysical sub-disciplines, and astronomy in general.*



JWST DD ERS Call for Proposals now available at jwst-docs.stsci.edu

More Details

https://jwst.stsci.edu/science-planning/early-release-science-program

Notice of Intent DUE March 3, 2017!

JWST Proposal and Planning Workshop

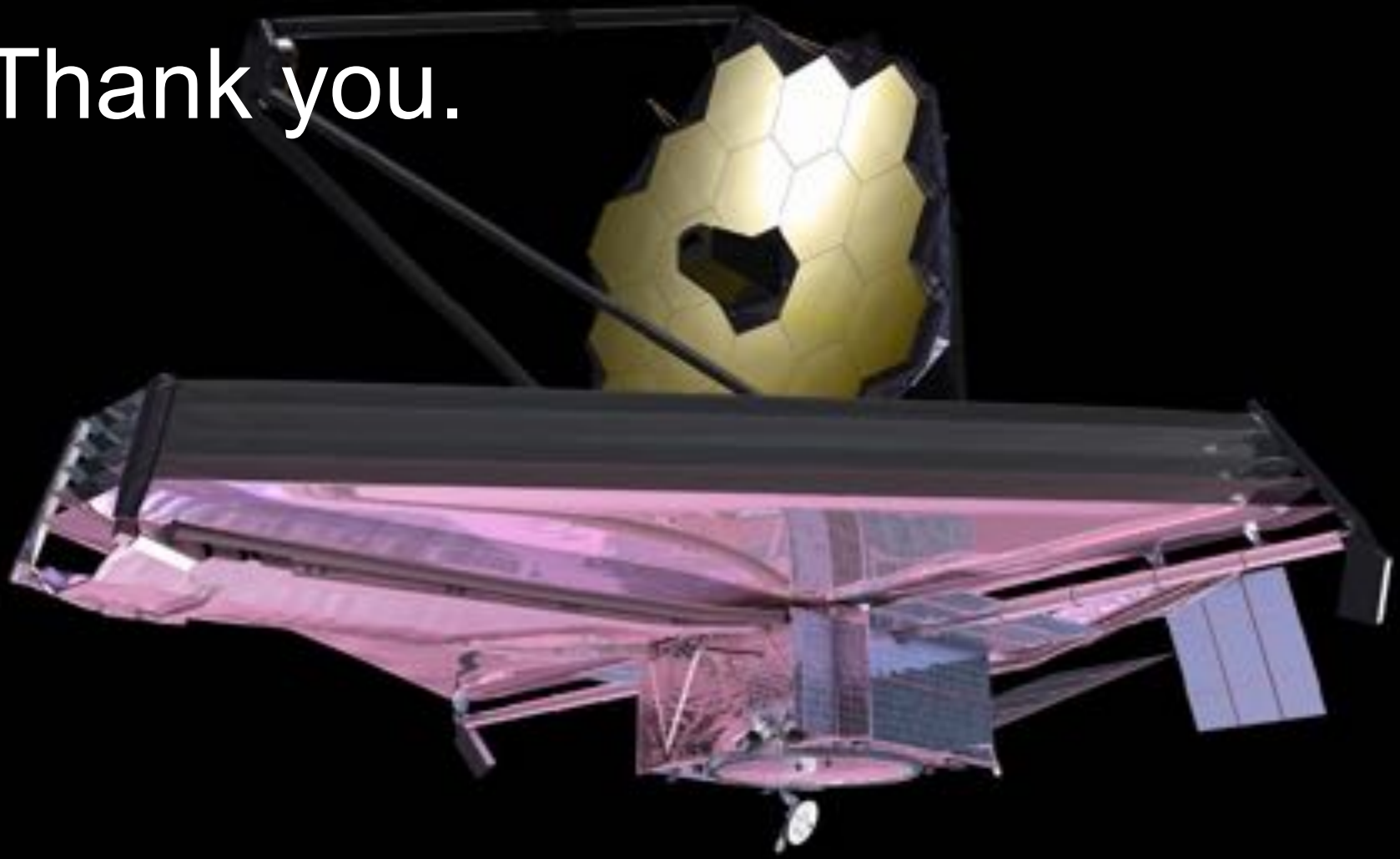
May 15 - 17, 2017

Baltimore, MD

JWST Supporting Observations

- HST Cycle 24 explicitly called for JWST preparatory observations.
  - Expect next two calls will.
  - Proposals due in April.
- Keck Observatory – NASA call
  - Pre-JWST observations (target selection) encouraged
  - Proposals due in March

Thank you.



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