STScI | SPACE TELESCOPE SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

NIRSpec

Elena Sabbi & the NIRSpec Team

JSTUC meeting 12/10/2020

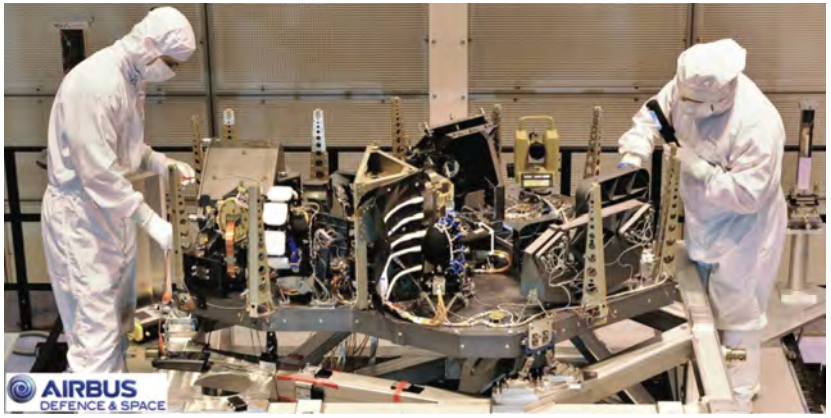
NIRSpec at a glance

NIRSpec is an infrared spectrograph

NIRSpec operates between 0.6 and 5.3 µm, with resolving powers ~100, ~1000, and ~2700.

NIRSpec supports 4 observing modes

Mode	Target Type	Corresponding Aperture
Fixed slit spectroscopy	Single objects	0.2″ x 3.2″ slits (3) 0.4″ x 3.65″ slit
Bright Object Time Series	Exoplanet host stars	1.6″ x 1.6″ aperture
Integral-field spectroscopy	Moderately extended objects	3.0″ x 3.0″ IFU with 0.1″ square spaxels
Multi-object spectroscopy (MOS)	Rich fields or extended objects	Selectable from ~250,000 0.2″ x 0.46″ micro-shutters



NIRSpec was built for ESA by Airbus Industries. The MSA and the detector subsystem were provided by NASA.

IDT PI Pierre Ferruit

Team structure & Responsibilities

ESA Science Operation Team

- Instrument Fabrication (IDT)
- Hardware support
- Primary ground test coverage
- Operations
- Instrument Commissioning
- Calibration Development
- Reference files from test data

Marco Sirianni

Catarina Alves de Oliveira

Stephan Birkman

Torsten Boeker

Nimisha Kumari

Nora Lutzgendorf

Elena Manjavacas

Nor Pirtzkal

Tim Rawle

Maurice Te Plate

Peter Zeidler

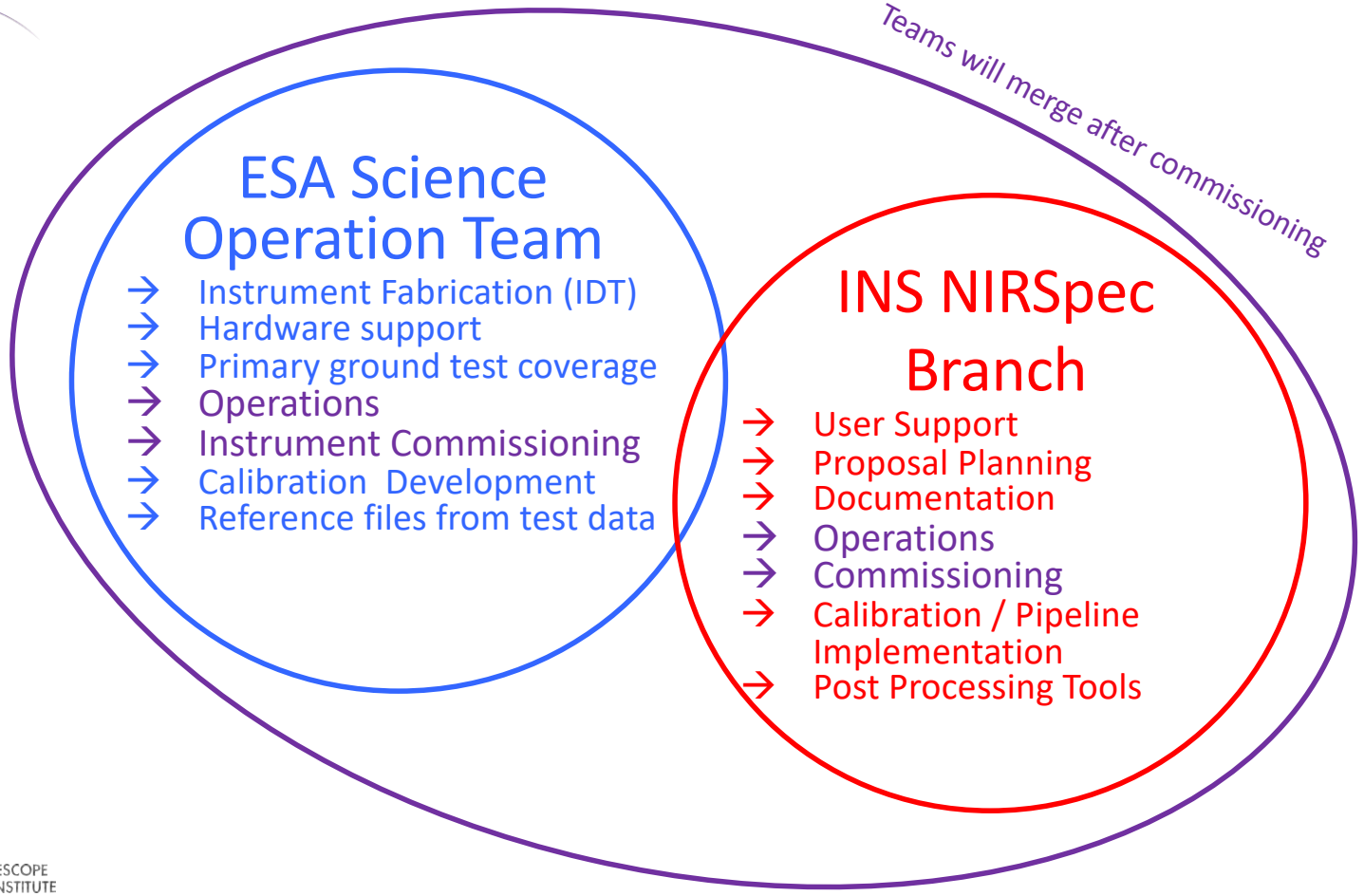
Team structure & Responsibilities

INS NIRSpec Branch

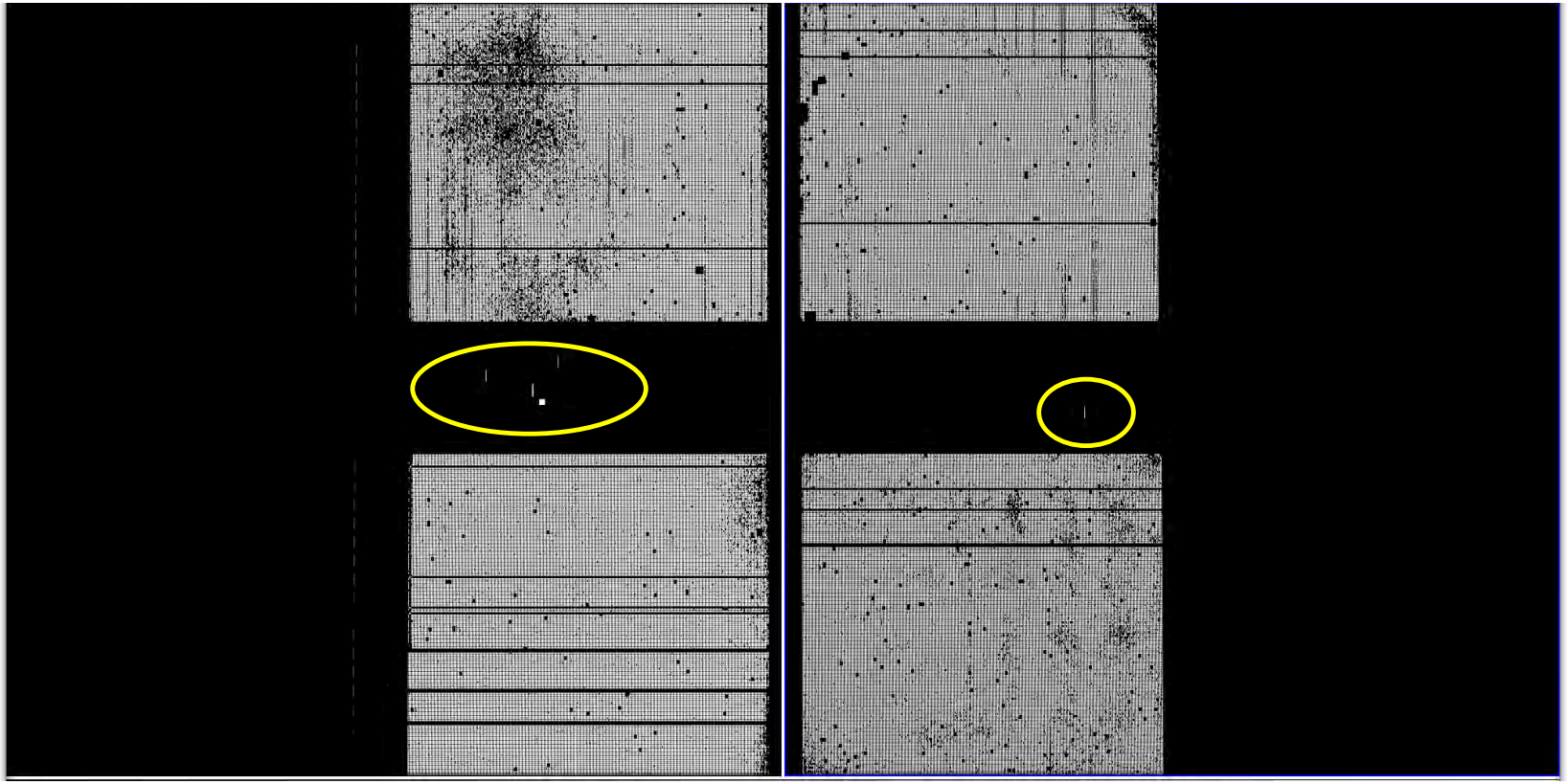
- → User Support
- → Proposal Planning
- → Documentation
- → Operations
- → Commissioning
- → Calibration / Pipeline Implementation
- → Post Processing Tools

Tracy Beck
Alaina Henry
Gray Kanarek
Diane Karakla
Tony Keyes
Teagan King
James Muzerolle
Patrick Ogle
Cheeryl Pavlovsky
Maria Pena-Guerrero
Charles Proffitt
Elena Sabbi
Beth Sargent
Leonardo Ubeda
Glenn Wahlgren
Emily Wislowski

Team structure & Responsibilities

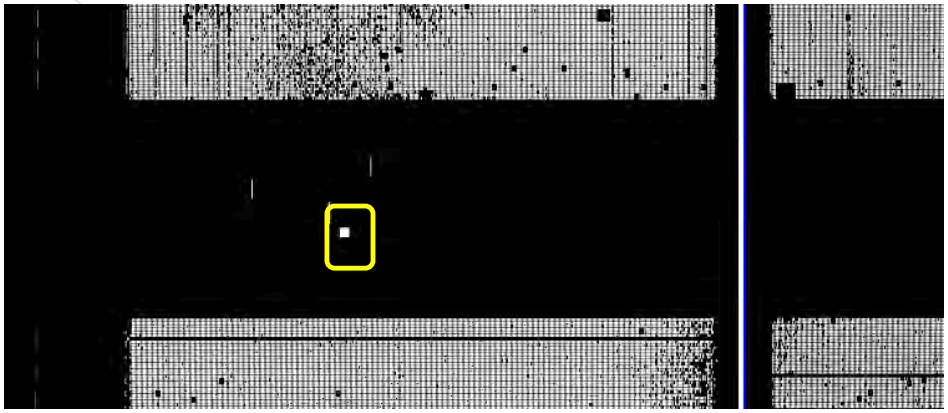


What do NIRSpec data look like

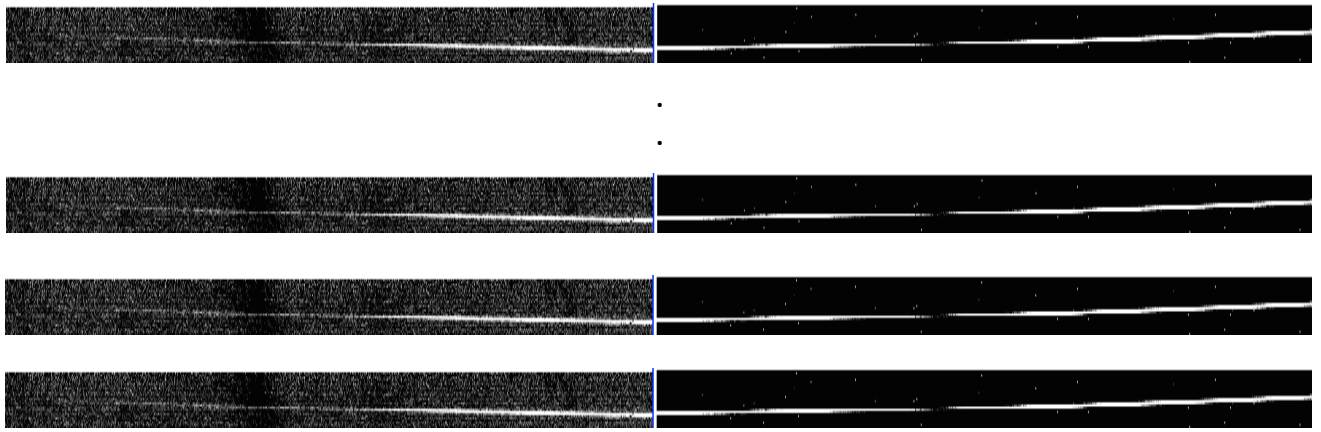


BOTS mode

Time Series Spectroscopy!

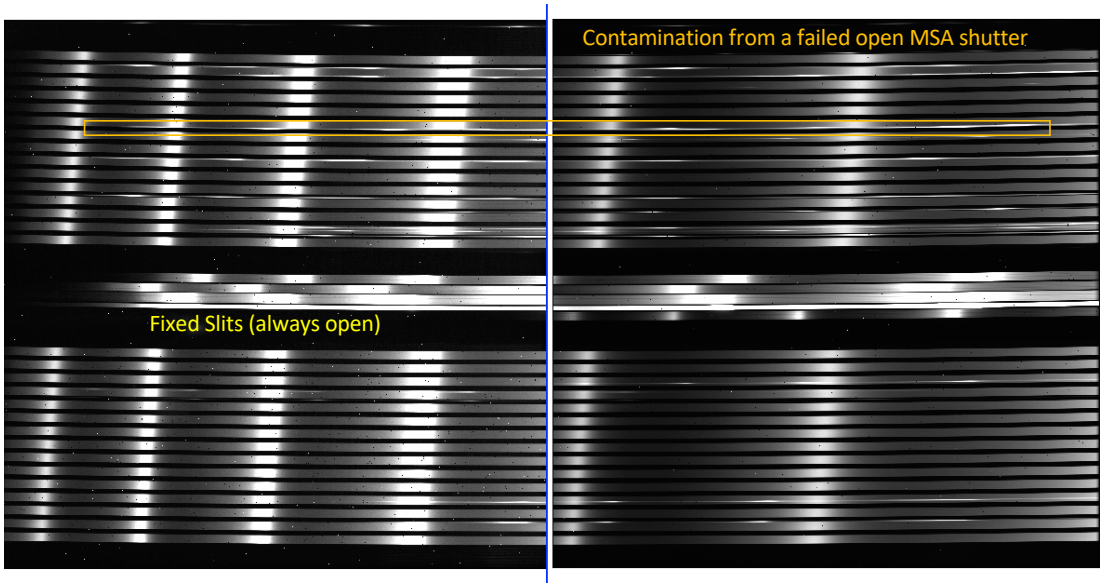


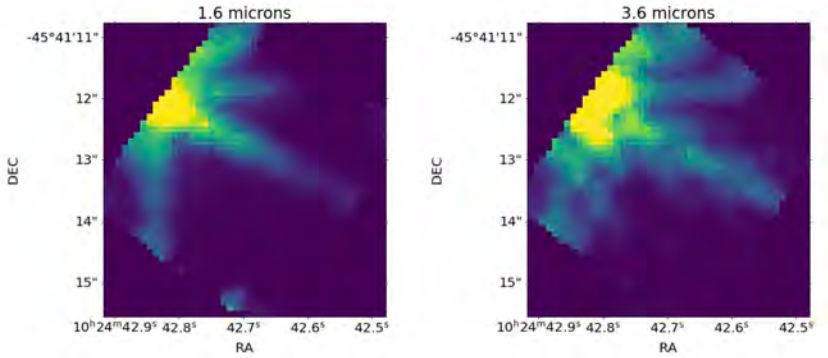
Integration… (up to) 65,535!

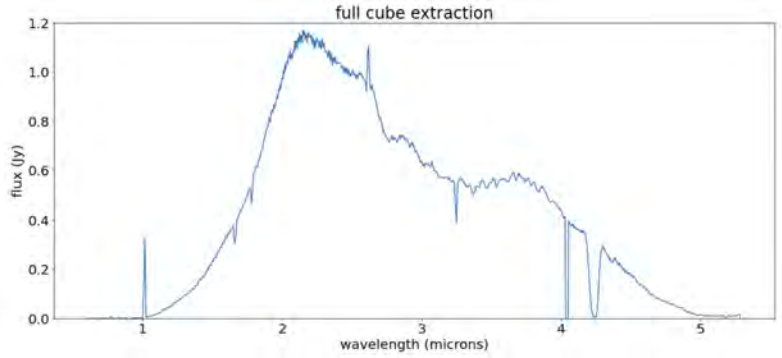


IFU mode

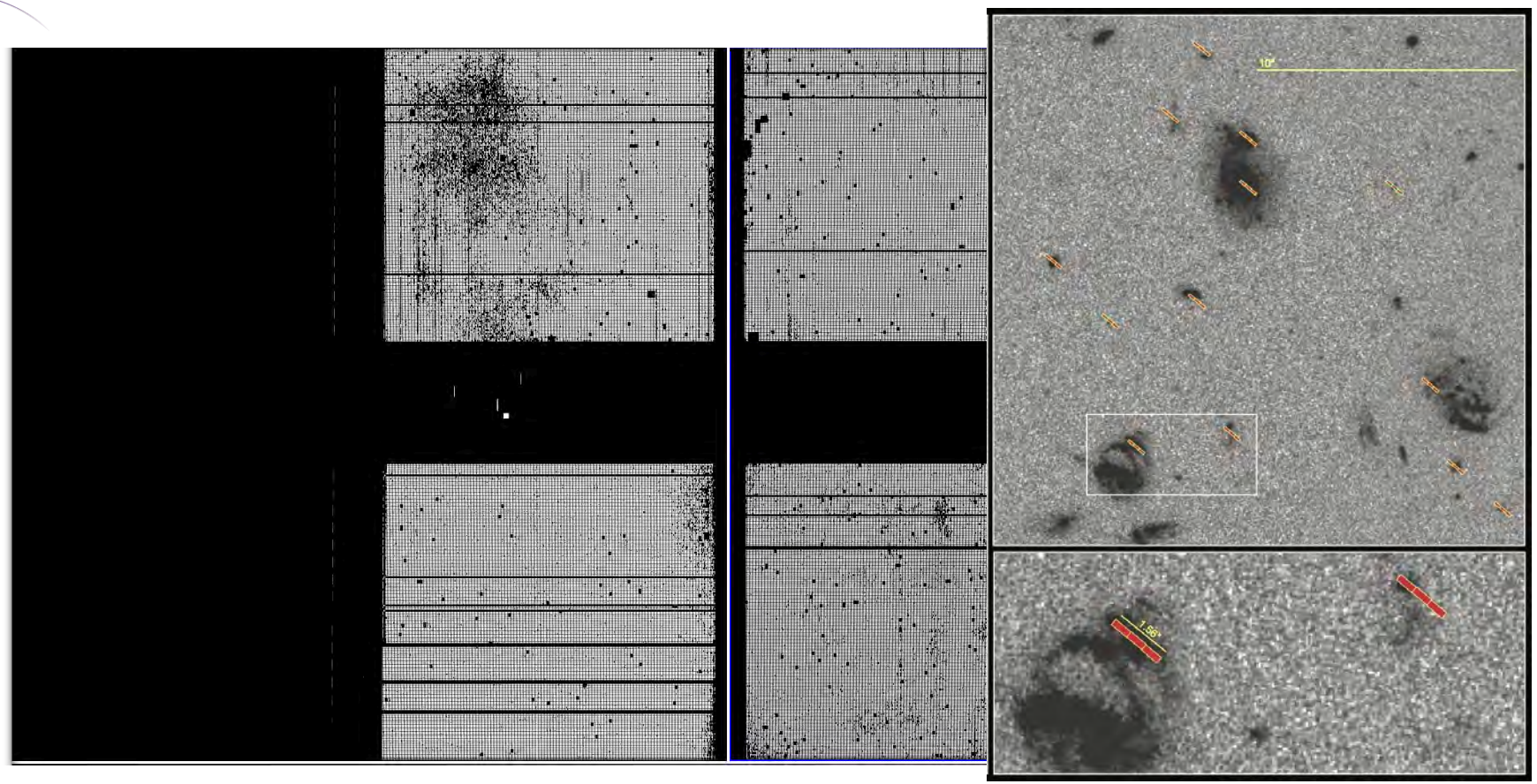
(internal lamp exposure from ISIM CV3 tests at Goddard)



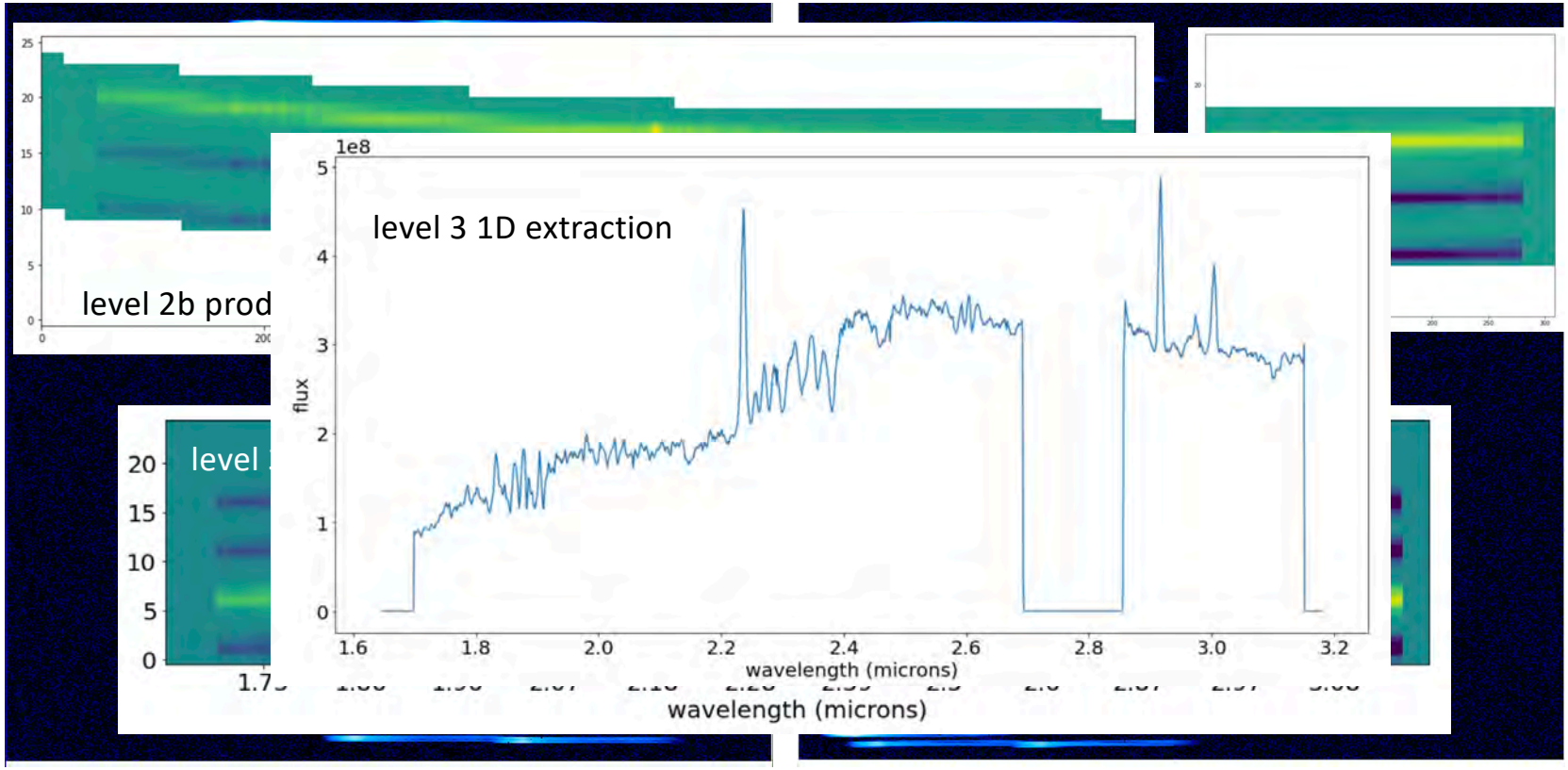




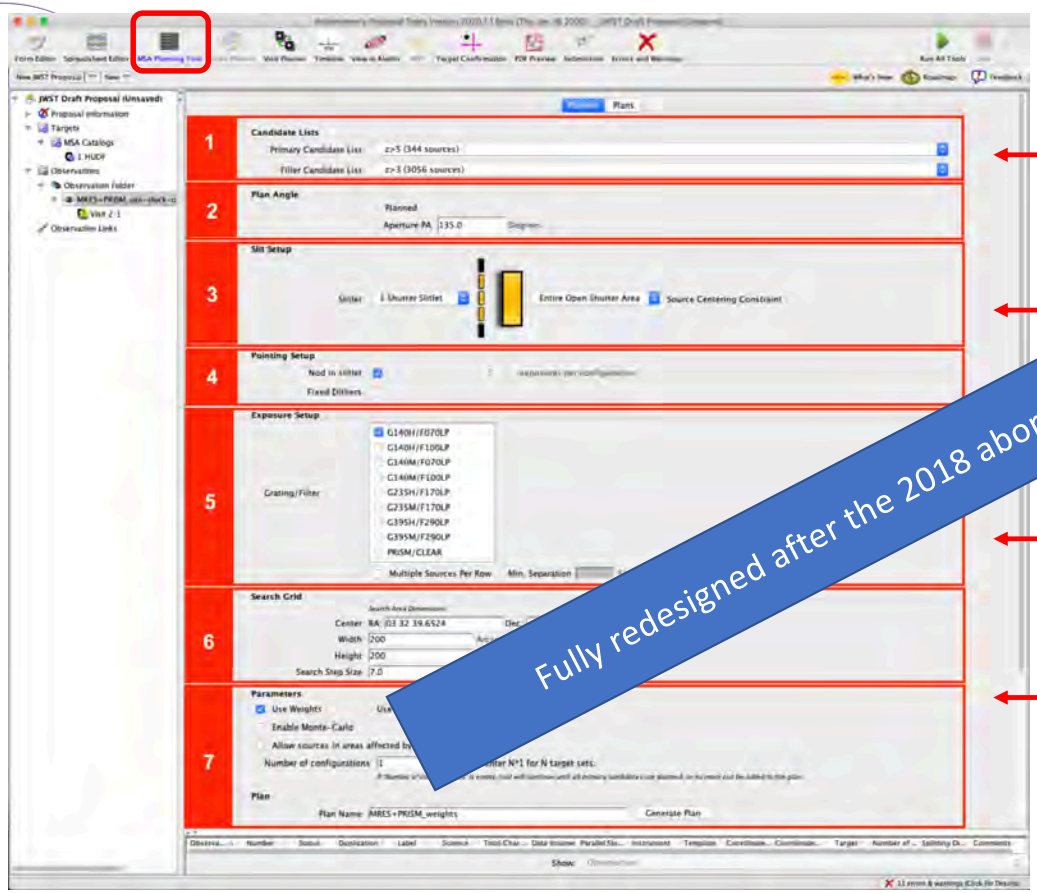
MOS mode



MOS mode


level 2b prod
level 3 1D extraction
1e8
flux
wavelength (microns)
wavelength (microns)

Planning MOS observations (MPT)



Upload source catalog

MSA "slitlet" shape

Dither-Nodding strategy

Filter selection

Generate observations

Fully redesigned after the 2018 aborted call for proposal

MOS proposal review

All GOs are asked to submit the science case and the full observing plan at CfP deadline.

MOS proposal are the big exception –

- Planned Aperture (PA) is assigned by STScI when the Long Range Plan is define
- Two steps submission:
  - A complete observing plan is submitted at the CfP (but not TA)
  - Second submission after PA assignment – Includes TA and and final targets

<u>Implications for the technical review</u>

At least for Cycle 1 (and possibly future cycles) we will use a rolling submission (maximize the flexibility of operations and telescope efficiency)

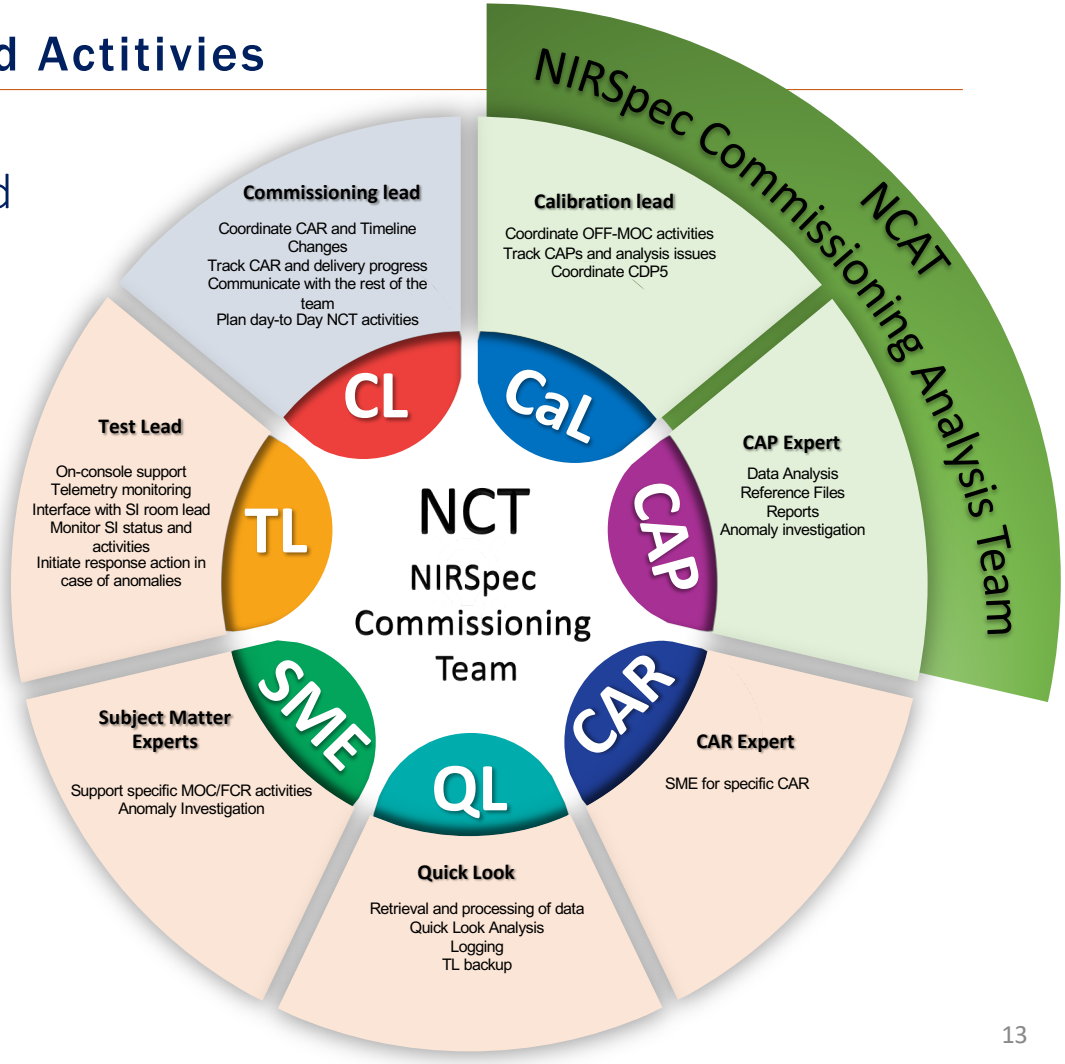
- MSA geometrical solution needed by MPT to correctly assign sources to the microshutter (~160 day in commissioning)
- Users will have to finalize their observations 6 weeks before the short range plan is prepared
- To limit accidents and favor a fast starting of operation we ask GOs that may get their data in the first 3 months of operations to submit their plans as soon as as soon as the geometric solution becomes available.

Commissioning Preparation and Actitivies

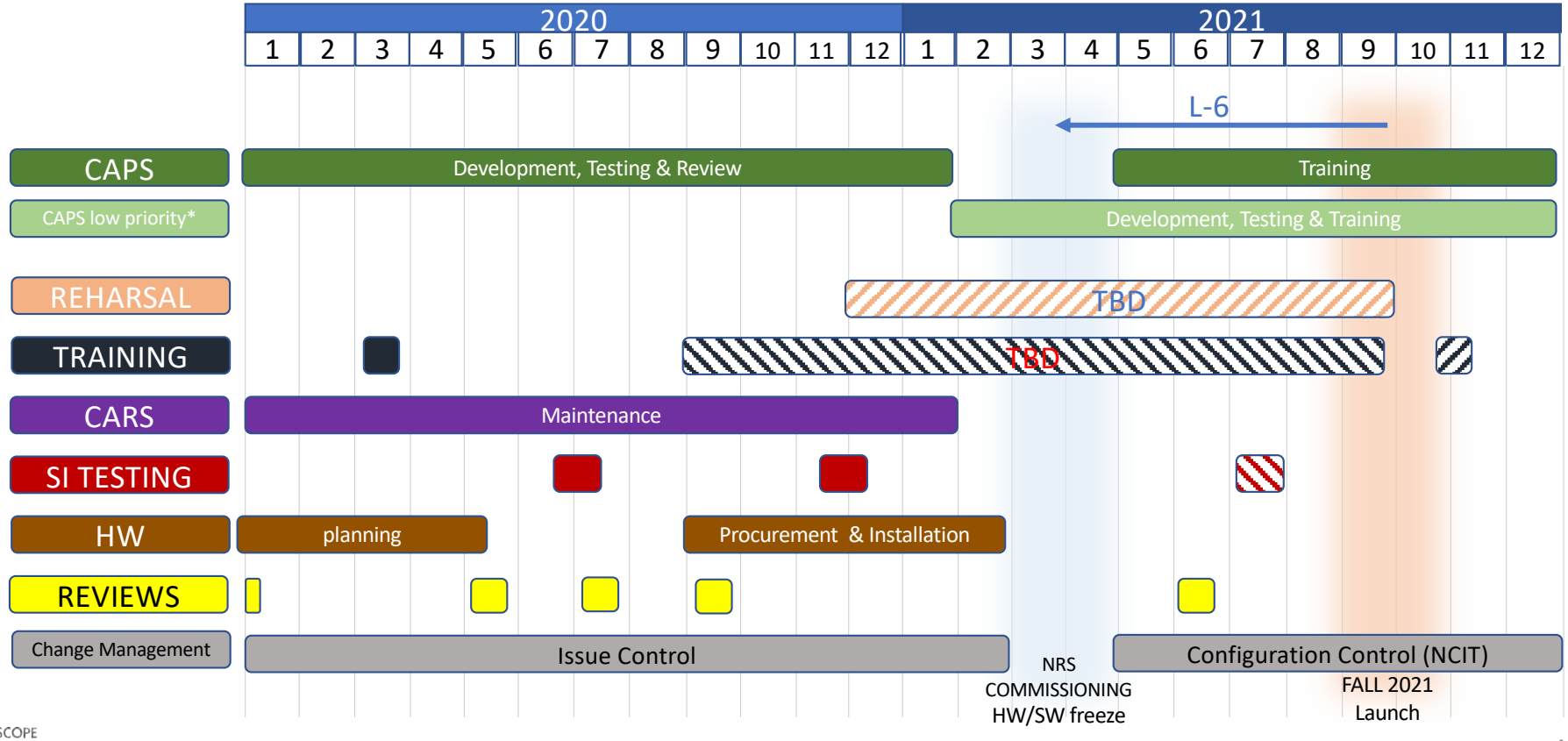
The INS NIRSpec Branch is fully involved in all the the Commissioning activities, both inside and outside the MOC

Commissioning activities and and Training are organized by the ESA SOT

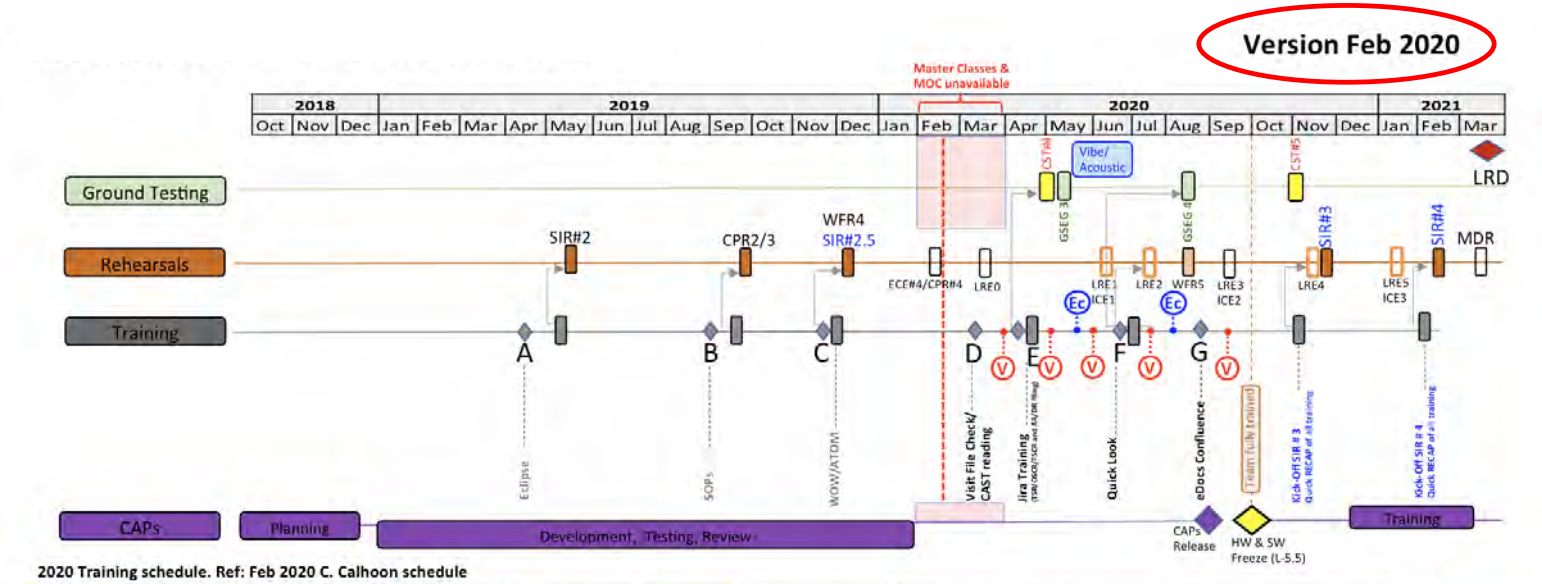
Training was strongly hit by the WFH situation, especially for Voice loop, Eclypse usage, etc. Should restart in February



NIRSpec Path to Commissioning



Training and Rehearsal Schedule for NIRSpec



2020 Training schedule. Ref: Feb 2020 C. Calhoon schedule

ECE#4/CPR#4: No SI involvement, deployments only	→ 11-13 Feb
CST#4 (at NGAS)	→ 30 Apr – 13 May 2020
GSEG#3: (All SIs)	→ 18-19 May 2020
LRE 1 (will have NIRSpec involvement)	→ June 2020
LRE 2 (has SI involvement incl NIRSpec)	→ July 2020
GSEG#4: (All SIs)	→ 13-19 Aug (after OBS Env)
WFR#5 (NRC and FGS only ?)	→ Aug 2020
CST#5 (at NGAS)	→ 28 Oct – 12 Nov 2020
LRE 4 (has SI involvement incl NIRSpec)	→ Nov 2020 (only SI engineering, no observations)
SIR#3: (All SIs)	→ Nov 2020, directly after LRE 4
LRE 5 (will have NIRSpec involvement)	→ Jan 2021
SIR#4: (All SIs)	→ Feb 2021

CPR – Contingency Planning Rehearsal
GSEG – Ground Segment Testing
SIR - Science Instrument Rehearsal
WFR – Wavefront Rehearsal
ECE – Early Commissioning Exercise
ICE – Integrated Crew Exercise
LRE – Launch Readiness Exercise

SOP – Standard Operating Procedure

LRE 0	L-12 months
LRE 1 - ICE 1	L-10
LRE 2	L-8
LRE 3 - ICE 2	L-6
LRE 4	L-4
LRE 5 - ICE 3	L-2
MDR	L-4 days

List of training exercises: **Trainer:**

A	- Eclipse training	MtP (done)
B	- SOP training	JB (done)
C	- Telemetry retrieval WOW/ATOM	MtP (done)
D	- Visit File Review and CAST reading	CP
E	- Jira Training (TSR/OSCR/FSCR and opening PR/DR)	TB/JB
F	- Quick Look	TR/MS
G	- eDocs / Confluence log	TB/CP

Quick sessions (hands-on)

(V)	- Voice Loop quick hands on session	MtP
(Ec)	- ECLIPSE quick hands on session	MtP

1-2 hr session training
Pre-rehearsal Training/Kick-OFF

Most up to date information about rehearsals at this page:

https://outerspace.stsci.edu/pages/viewpage.action?spaceKey=JMOP&title=Rehearsals+Page

Data Analysis Tools for the JWST Community

- Based on Jupyter platform
- Use libraries, like astropy, specutils, etc.
- Flexible and easy to embed in different workflows
- Designed to work within a Jupyter notebook, as a standalone desktop application, or as embedded windows within a website (e.g., in MAST!)
- Three preset configurations
  - Specviz
  - MOSviz
  - Cubeviz

Jdaviz

Notebooks with science cases on how to use the tools

Camilla Pacifici & the JDAT team

Thank you

Tracy Beck
Alaina Henry
Gray Kanarek
Diane Karakla
Tony Keyes
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Maria Pena-Guerrero
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