

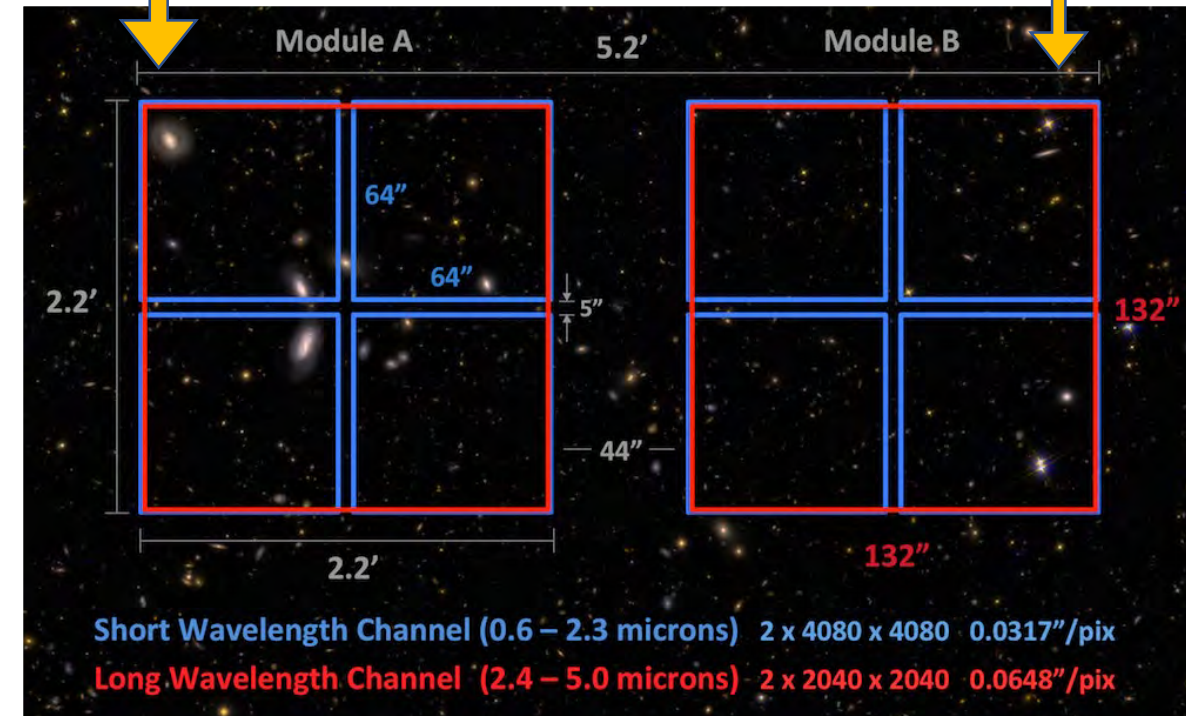
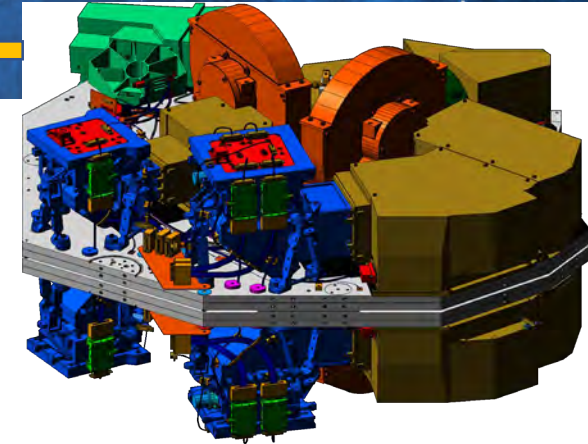
NIRCam Status & Update

Martha Boyer (NIRCam Branch Lead) for the NIRCam team



NIRCam

- Near-Infrared Camera for JWST
 - short (0.6-2.3 μm) and long (2.4-5 μm) channels
 - Nyquist sampling at 2 and 4 μm
 - 2.2' x 4.4' total field of view, 42 million pixels
 - Coronagraph for both short and long wavelengths
 - LW Grisms for time series and wide field slitless surveys
- NIRCam is the wavefront sensor
 - Must be fully redundant
 - Dual filter/pupil wheels for WFS hardware
 - Pupil imaging lens to check optical alignment

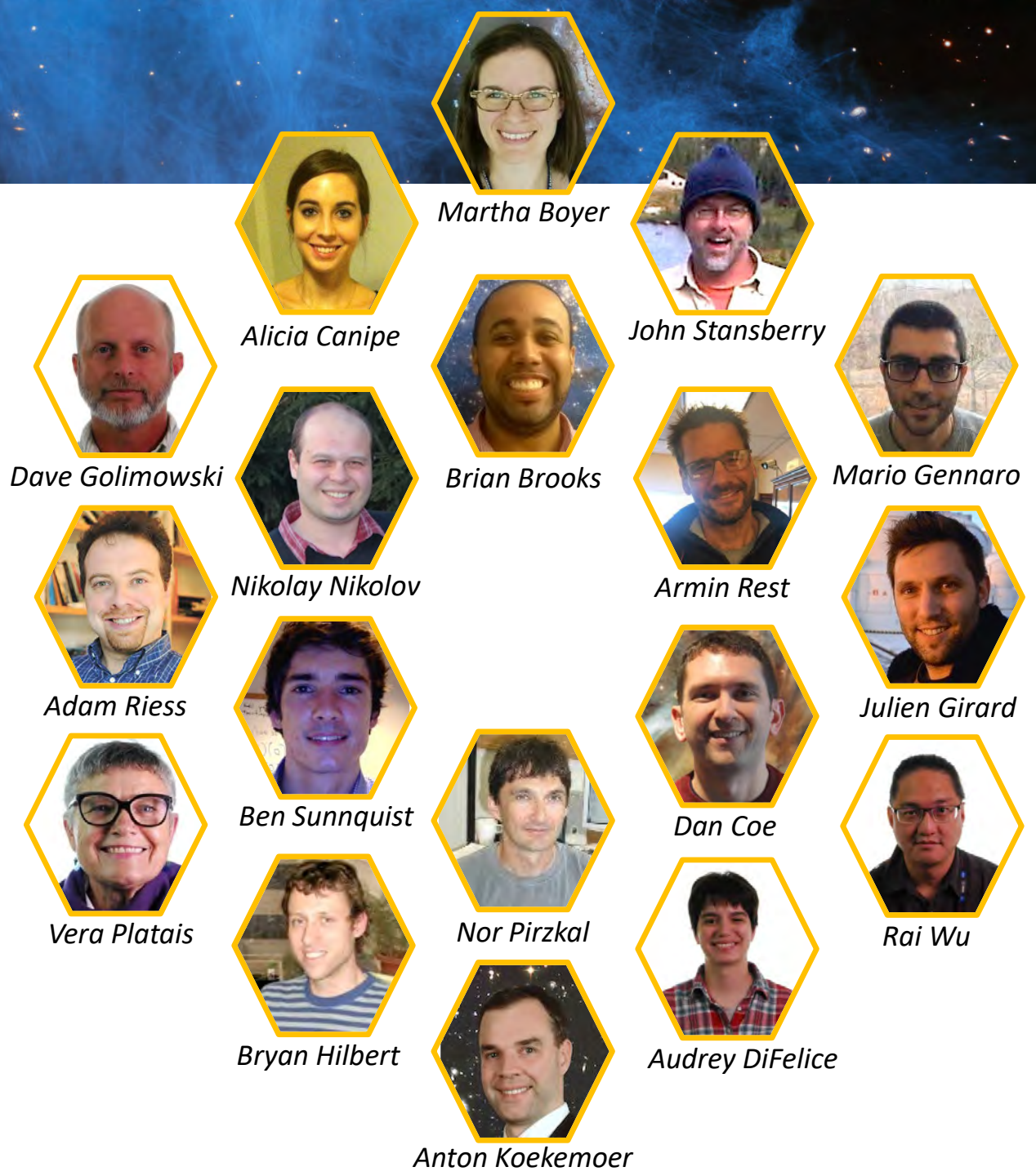




STScI NIRCam Team

Martha Boyer
 Brian Brooks
 Alicia Canipe
 Dan Coe
 Mario Gennaro
 Julien Girard
 Dave Golimowski
 Bryan Hilbert
 Anton Koekemoer

Nikolay Nikolov
 Nor Pirzkal
 Vera Platais
 Armin Rest
 Adam Riess
 John Stansberry
 Ben Sunnquist
 Audrey DiFelice
 Rai Wu





NIRCam Status

- Performing well, with no new anomalies
- Some issues with scattered light features and persistence
- Help desk tickets dominated by 1/f noise and alignment woes
- SW+LW coronagraphy (Enabled for Cycle 2)
 - Remaining Cycle 1 programs given the option to delay until this mode is enabled
- Additional new modes/capabilities are being explored (see talk by Maca)



NIRCam Pipeline Update

- Reference pixel correction does not yet fully correct $1/f$ noise
- Default pipeline parameters do not always result in good alignment
 - Adjustments to tweakreg parameters and or additional tools (e.g., JHAT) work well.
- The WFSS contamination correction is in the implementation phase
- TSO level-3 improvements to outlier detection are in progress



NIRCam Calibration Program Status

- ~ 2/3 of the program has executed
- Most reference files are based on in-flight data
- Recent reference file deliveries:
 - Absolute flux calibration for NIRCam imaging delivered in October 2022.
 - Flats, darks, superbias, and readnoise reference files all updated.
 - Grism flux and spectral calibration files delivered this month, but won't be implemented until later this Spring (requires a pipeline code change).
- Upcoming updates (as calibration data are taken):
 - Distortions / Alignment
 - Updated P-flats
 - Updated flux calibration using more standard stars, including repeatability



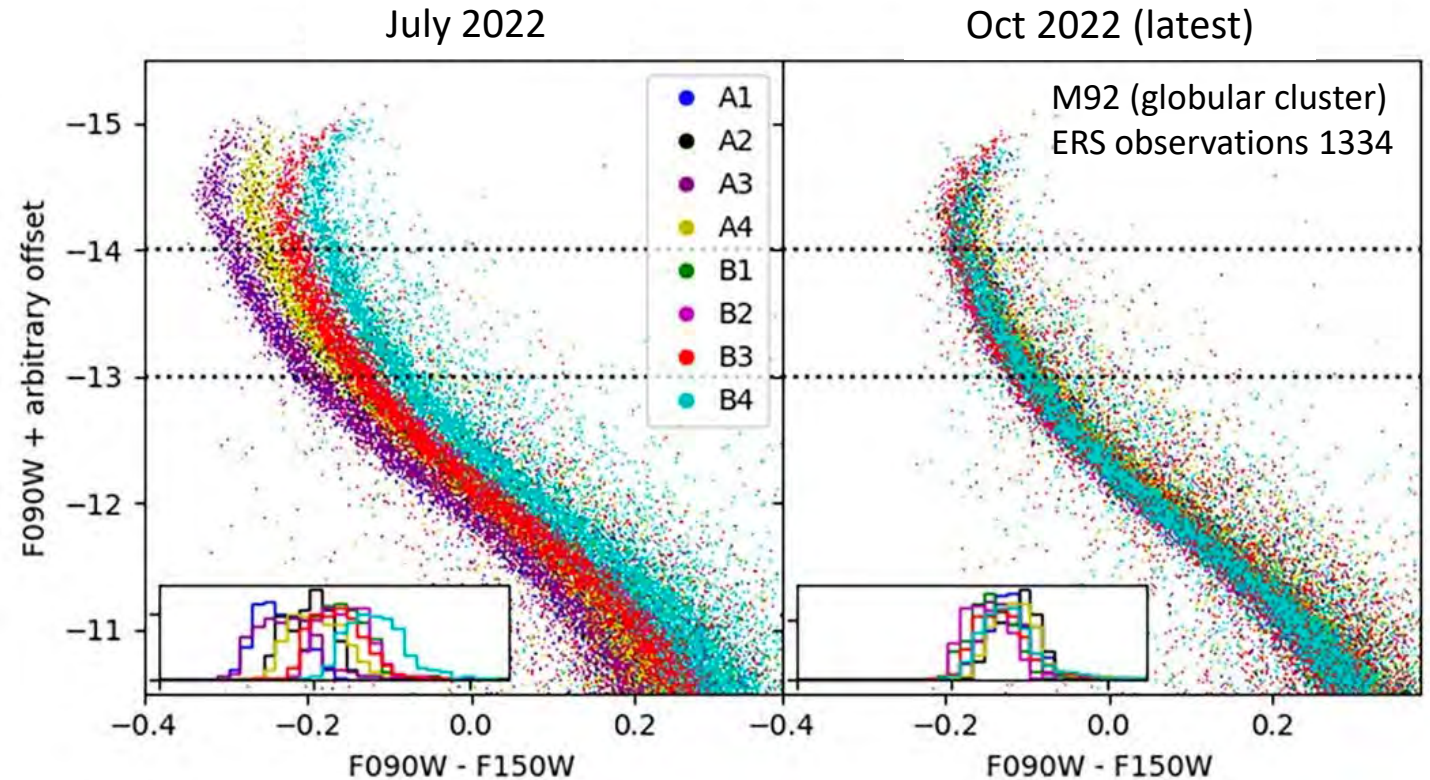
NIRCam Absolute Flux (Imaging)

Analysis from M. Boyer

July 2022 delivery – 2 standard stars placed on a single detector during Commissioning (B1/B5).

October 2022 delivery – 3 standard stars on module B, 2 on Module A, measured on every detector.

Reports from the community (e.g., Bagley et al. 2023) and independent analysis from the IDT indicate good agreement with the Oct 2022 delivery..



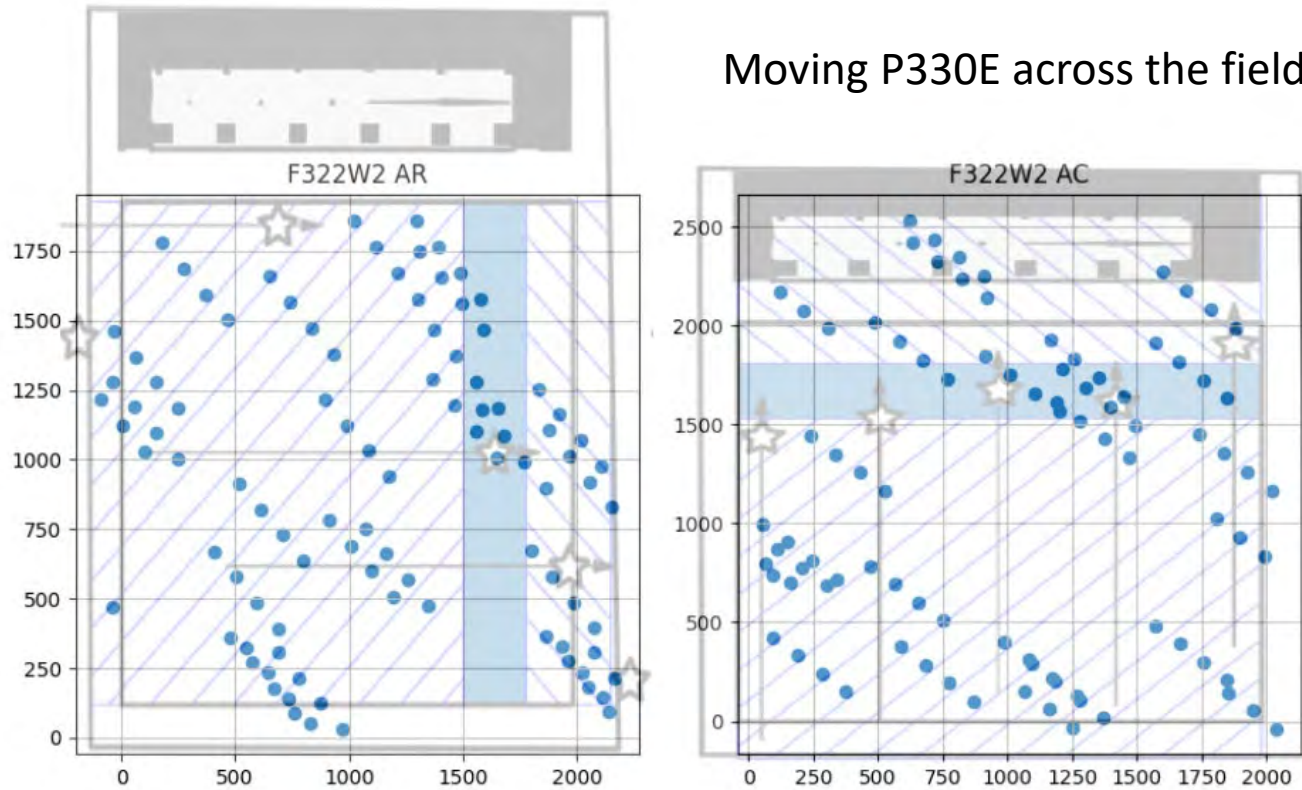
Current flux calibration within 5%



NIRCam Grism Calibration - Trace

Analysis from Nor Pirzkal

Moving P330E across the field



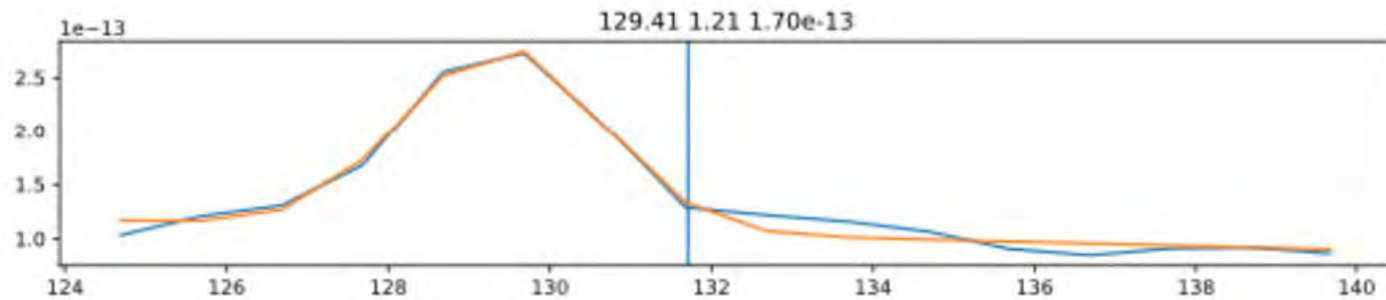
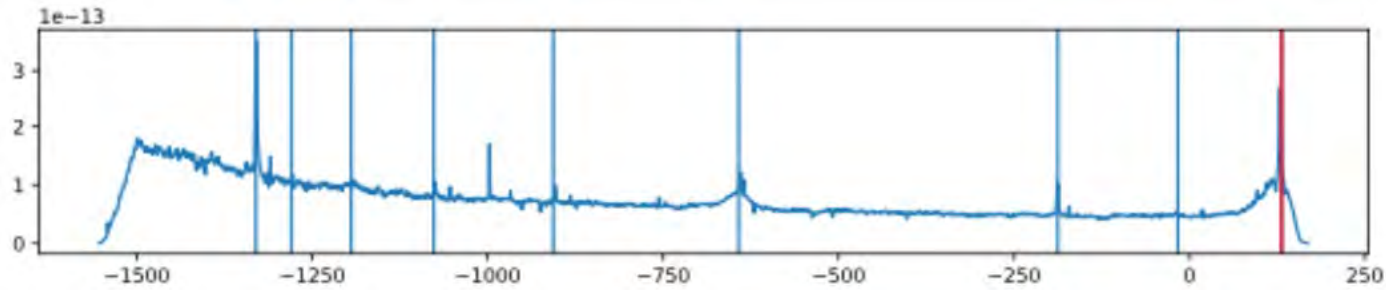
	F322W2	F444W
A/R	$\sigma = 0.13$ (pix)	$\sigma = 0.11$ (pix)
A/C	$\sigma = 0.14$ (pix)	$\sigma = 0.15$ (pix)
B/R	$\sigma = 0.13$ (pix)	$\sigma = 0.1$ (pix)
B/C	$\sigma = 0.15$ (pix)	$\sigma = 0.21$ (pix)



NIRCam Grism Calibration - Wavelength

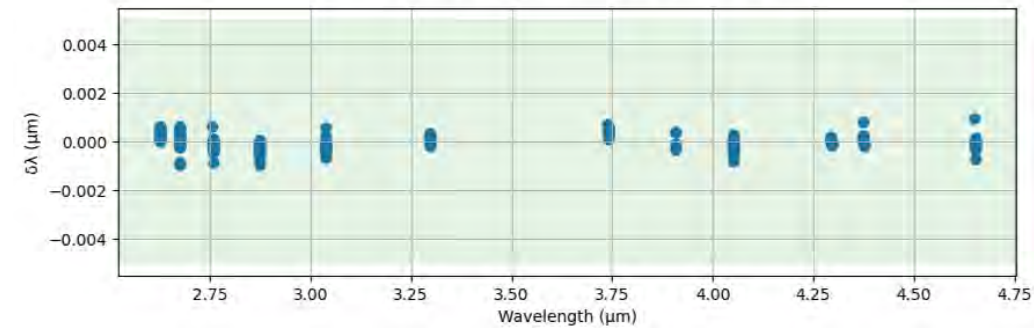
Analysis from Nor Pirzkal

12 emission lines in planetary nebula SMP LMC 058 were fit at ~16 positions for all four grisms



	F322W2	F444W
A/R	$\sigma = 0.0003 \text{ } (\mu\text{m})$	$\sigma = 0.0003 \text{ } (\mu\text{m})$
A/C	$\sigma = 0.0003 \text{ } (\mu\text{m})$	$\sigma = 0.0003 \text{ } (\mu\text{m})$
B/R	$\sigma = 0.0003 \text{ } (\mu\text{m})$	$\sigma = 0.0003 \text{ } (\mu\text{m})$
B/C	$\sigma = 0.0003 \text{ } (\mu\text{m})$	$\sigma = 0.0003 \text{ } (\mu\text{m})$

All wavelength residuals of all the fits





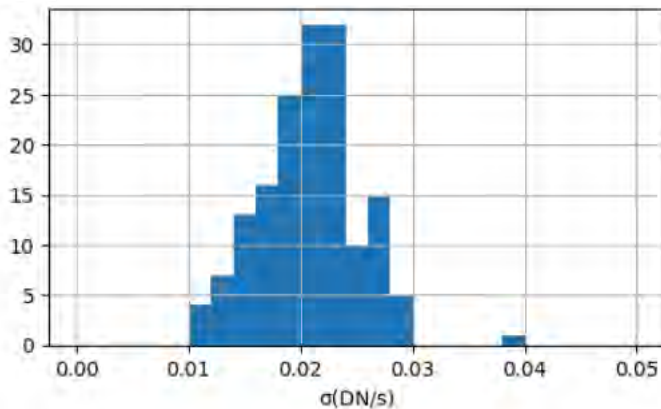
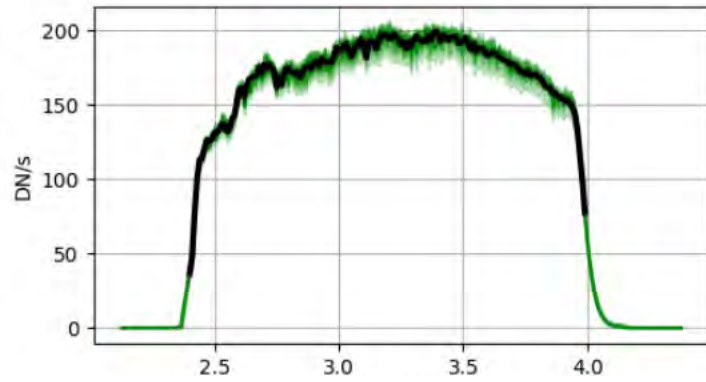
NIRCam Grism Calibration - Flux

Analysis from Nor Pirzkal

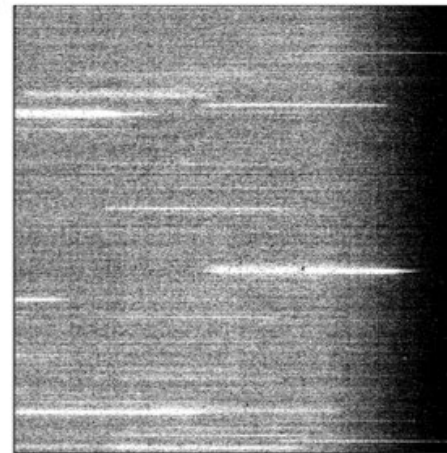
P330E: Variation from Calspec spectrum is **~2-3%**.

Additional Cycle 1 calibration includes more standard stars at more detector positions

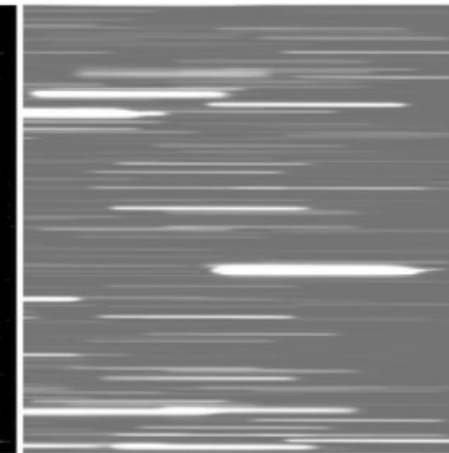
F322W2, Module A, GRISMR



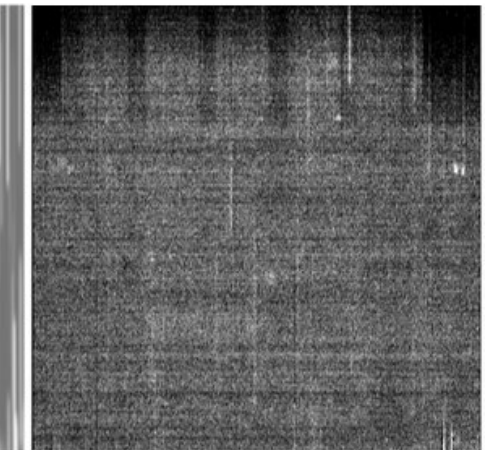
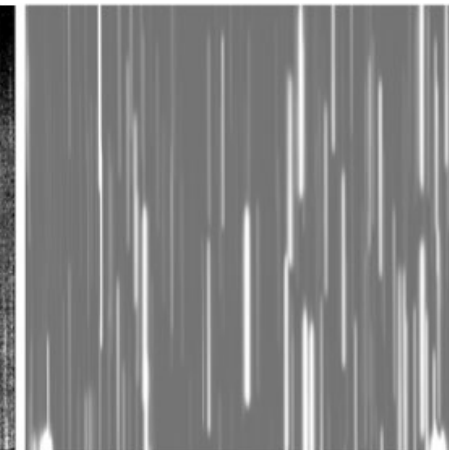
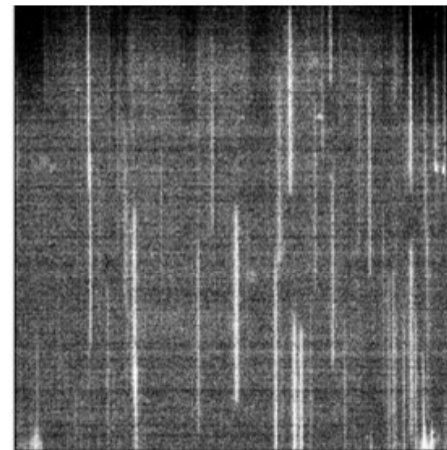
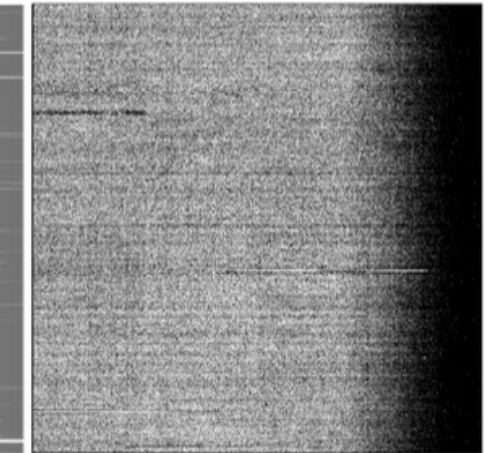
Observations



Simulations

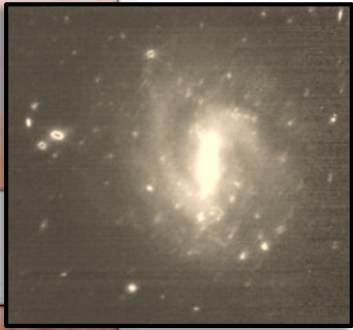
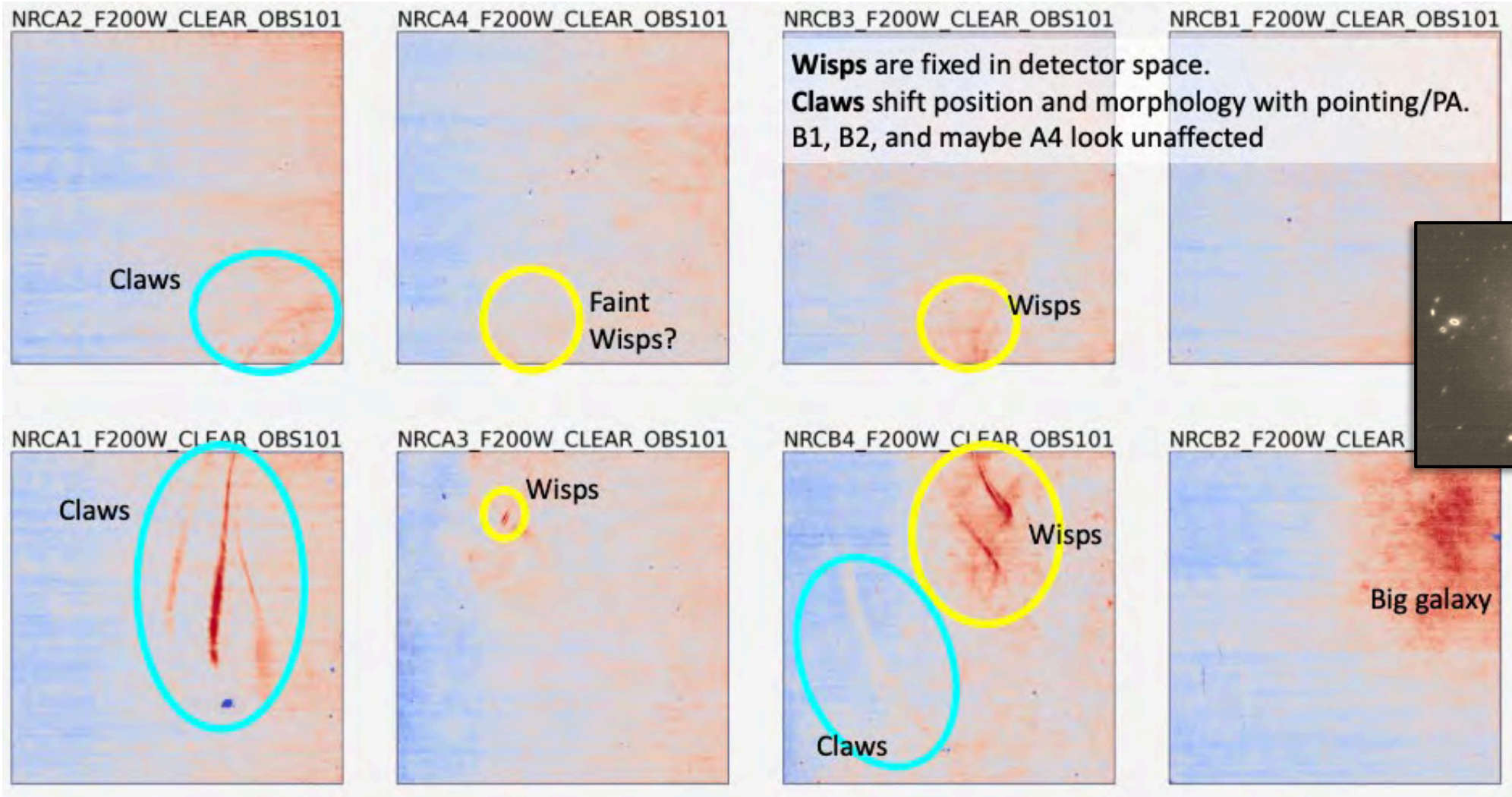


Residuals





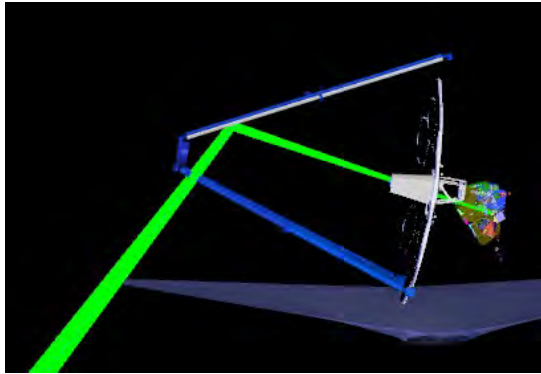
Scattered Light – Claws & Wisps



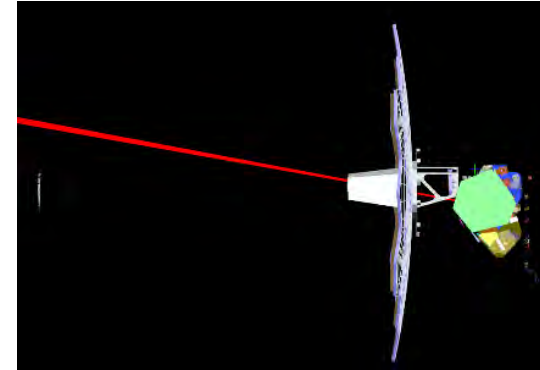
Claw & wisp analysis: Mario Gennaro, Ben Sunnquist, Martha Boyer, Marcia Rieke, John Stansberry, Christopher Willmer



Claws and Wisps



Wisps result from off-axis light bouncing off the top secondary mirror support and entering into the aft-optics-system (AOS) mask

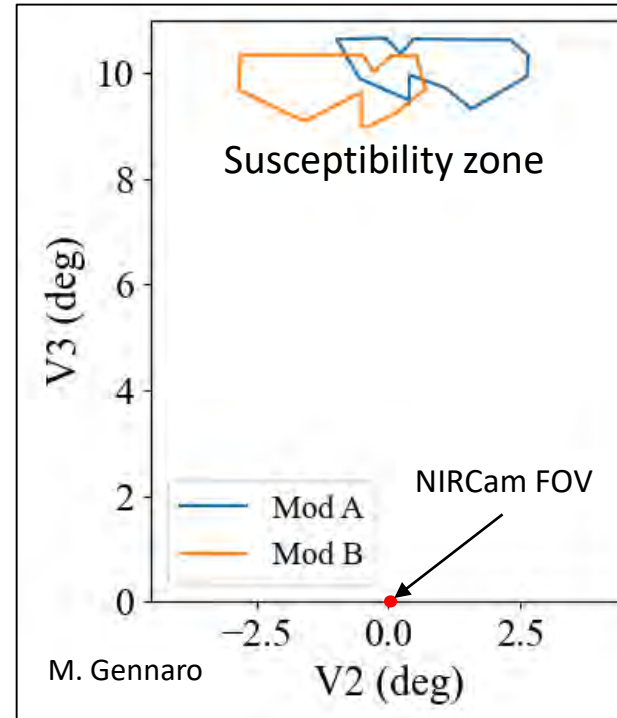


Claws are caused by a very bright source far from the NIRCam FOV, whose light enters directly into the AOS mask.



Wisps can be subtracted using a wisp template and scaling the strength to match the observed wisps

C Willmer



Claws can be prevented by avoiding placing very bright stars in a susceptibility zone



Claws and Wisps

- Claw frequency appears to be low
 - So far, 33 observations with claws, affecting 17 programs.
 - Only one help desk ticket so far
- Wisps: always there
 - Only one help desk ticket so far
- Mitigation
 - Wisps: developing a template that can be subtracted from data (a Commissioning version exists and is on JDox)
 - Claws: developing a tool that predicts claws
 - Will use on existing data to refine the susceptibility zone
 - Will use during the IS review stage for Cycle 2
 - Plan to release the tool to users for future cycles.



Persistence

- A few programs have been hit hard by persistence, primarily following observations of Jupiter and Orion.
- Proposed mitigation:
 - IS reviews: flag programs likely to cause persistence and work with schedulers to not schedule NIRCam obs for 1-2 hrs afterwards
 - Future: explore ways to correct persistence either in the pipeline or in a stand alone tool.



Questions?
